

Everything you need under one cover

Win a trip to Transylvania P238

Personal Computer World

September 1996 £2.95

Overseas Price £3.95
Germany DM 20,00 Italy 18,000 Lire
Spain 1,225 PTS Malta Lm 2.85c
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VNU Business Publications

<http://www.pcw.vnu.co.uk>

US Robotics p60
Palm Pilot 5000

Compaq's DeskPro 2000



100MHz Pentium for £820

Windows 97
Sneak preview of Memphis

Network Computers

The end of PCs as we know them?

Scanners

18 tested from £75

10 Paint Packages

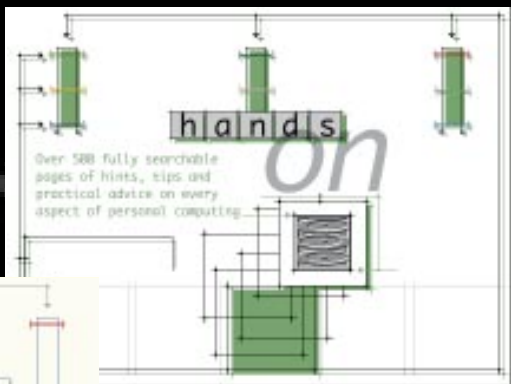


Corel WordPerfect 7 Suite for Windows 95



PCW CD no.1

12 months of
Hands On
in fully searchable
Acrobat format



Resources

Library of essential
shareware, freeware
and drivers

Getting Started

Interactive
guide to
PCs



Games

Strife, Wayne
Gretski NHL 96,
Indiana Jones
and his desktop
adventures,
Ice Breaker



Arts MIDI masterpieces and
graphic images from Image Bank



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ONLINE SERVICE, FREE!**

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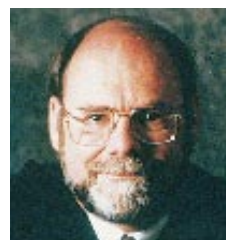
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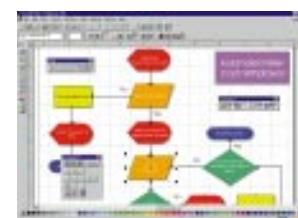
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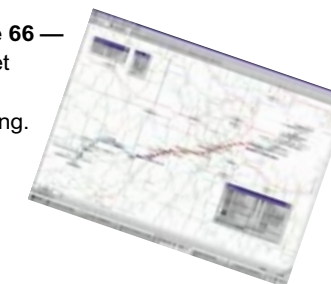
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Personal Computer World

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149,890
JULY-DEC '95



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We keep a stock of past issues and can provide individual copies at a charge of £5. Freephone 0800 526669.

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Advertisement typesetting by Typematters, London N1.

Origination by Latent Image, 6 Balmoral Grove, London N7.

Printed and bound in the UK by St Ives plc, Plymouth. Distributed by Comag, Tavistock Road, West Drayton, Middlesex (01895 444055).

Next Month

Personal Computer World

Editorial

Get ready for an all new PCW! The next issue of Britain's best computer magazine will be redesigned from top to bottom, making it better than ever before.

Which Web Editing Tool?

— Software for online design

Multimedia Authoring Tools

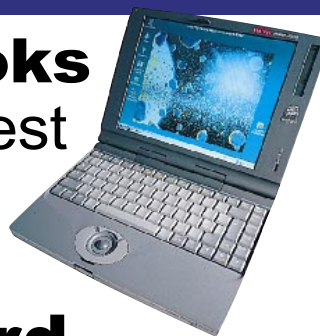
— Leading Windows development systems head to head



Group Test

Pentium Notebooks

PCW reviews the latest in portable power



Word Processors

The write stuff

“NOW, ABOUT PCWI. IT'S horrible, inelegant and inefficient. Usually I know what I want from the CD-ROM, and I don't want to have to fart around going through several screens of cr** before I can get to it... It would also be a good idea to give the 'Hands On' people more space on the CD; put the 'Hands On' section on there... then we'd all be jumping to get the CD in the drive...”

Sadly, this extract from a reader's letter has been all too typical of recent response to our cover-mounted CD. That's why I'm pleased to announce our new, completely redesigned CD this month.

PCW now has a team of three multimedia developers working full time on producing our cover-mounted CDs. Since Christmas they've been beavering away, designing and coding the new PCW Interactive interface. We're confident that it's now a faster, more stable, easier to use product.

On top of the new interface we've introduced two other completely new features to PCW Interactive. The first is the inclusion of *Personal Computer World's* popular *Hands On* section in Acrobat format. This means you can view *Hands On* pages from the past year just as they originally appeared in the magazine and print them out as required. Even better, it means you can search pages by keyword in a couple of seconds.

Secondly, we've started to use Netscape, the world's most popular browser, as the way of downloading all the software we include on the CD, onto your hard disk. If you haven't used it before it will take a few moments to get used to, but once mastered you should find it a much faster, smoother way of accessing stuff from the CD.

The first edition of the new PCW Interactive is only the beginning. I hope you like it, but if there's anything you think we could do better, email me at PCW@VNU.CO.UK

Ben Tisdall
Editor



October 96 issue
— On sale Thursday 5th September

November 96 issue
— On sale Thursday 3rd October

* Next month's contents subject to change.



Personal
Computer
World

September Cover Disc

Starting this month, we've redesigned the *PCW* CD-ROM cover disc. It's now better than ever before, with nine easy-to-access sections. Just click and go to anything that takes your fancy.

Welcome to issue No.1 of the new-look *Personal Computer World* CD. Our new look CD-ROM is divided into nine sections. Each has its own icon (see the examples, here).

Each of the nine sections is almost always visible on-screen and you can move from section to section just by clicking that line.



● Arts

Music, in the form of MIDI files, video samples and 32-bit colour images.



● Focus On

A look at our VNU European labs, introduced by labs manager George MacDonald.



The Room, VNU's intriguing new Web e-zine



● Games

Here you can preview the five games on this month's CD. Some games you can play straight away. Others you'll need to install first, or can only play from DOS.



● Getting started

An interactive guide to personal computers, complete with buying tips.



Start here: interactive guide to buying a PC



● Hands On

Install and launch the Acrobat reader to view and search *PCW Hands On* articles from the past year.



● Multimedia

This contains the latest interactive Windows demos.



● Reference

PCW reviews index, ad index, glossary and info.



The Ad Index is part of the reference section



Our glossary of computer terms. We'll be expanding it over the coming months



● Resources

A library of shareware, fonts, utilities and drivers, each with a brief description which can be copied onto your hard disk, using Netscape.



A quick way of looking up *PCW* reviews



● The Room

VNU Business Publications' new e-zine, and a chance to see Netscape's frames technology in action

Floppy disk

Blake Stone — Aliens of Gold

A great 3D game from Apogee in the Doom tradition which we've somehow managed to squeeze onto a single floppy disk.

To install Blake Stone, from File Manager or Windows 95 Explorer double-click on *PCW.exe* and follow the instructions. To install Blake Stone from the CD, go to the "floppy" directory and click on *floppy.exe*.



PROBLEMS

● If you have problems with the floppy such as a message "cannot read from drive a:" please return the disk to TIB plc, TIB House, 11 Edward Street, Bradford BD4 7BH, together with an SAE and two 25p stamps. Where it is a duplication fault the postage will be returned with your replacement disk. TIB is on 0274 736990.

● Our floppy disk hotline is available on weekdays from 10.30am - 4.30pm on 0891 715929.

● *PCW* cover disks are thoroughly virus checked, but *PCW* cannot accept liability for problems arising from use of the disk.

You are advised not to install any software on a networked PC without checking it first.

How to use the CD-ROM

- Quit existing applications.
- Put the disk into your CD-ROM drive.
- Win 95: If you've got Windows 95, the *PCW* Interactive loader will appear on your screen. If your CD doesn't auto-load, start Windows Explorer and double-click *PCW.exe*.

Win 3.1: From Windows Program Manager choose File/Run, then type in *PCW.exe* and press enter.

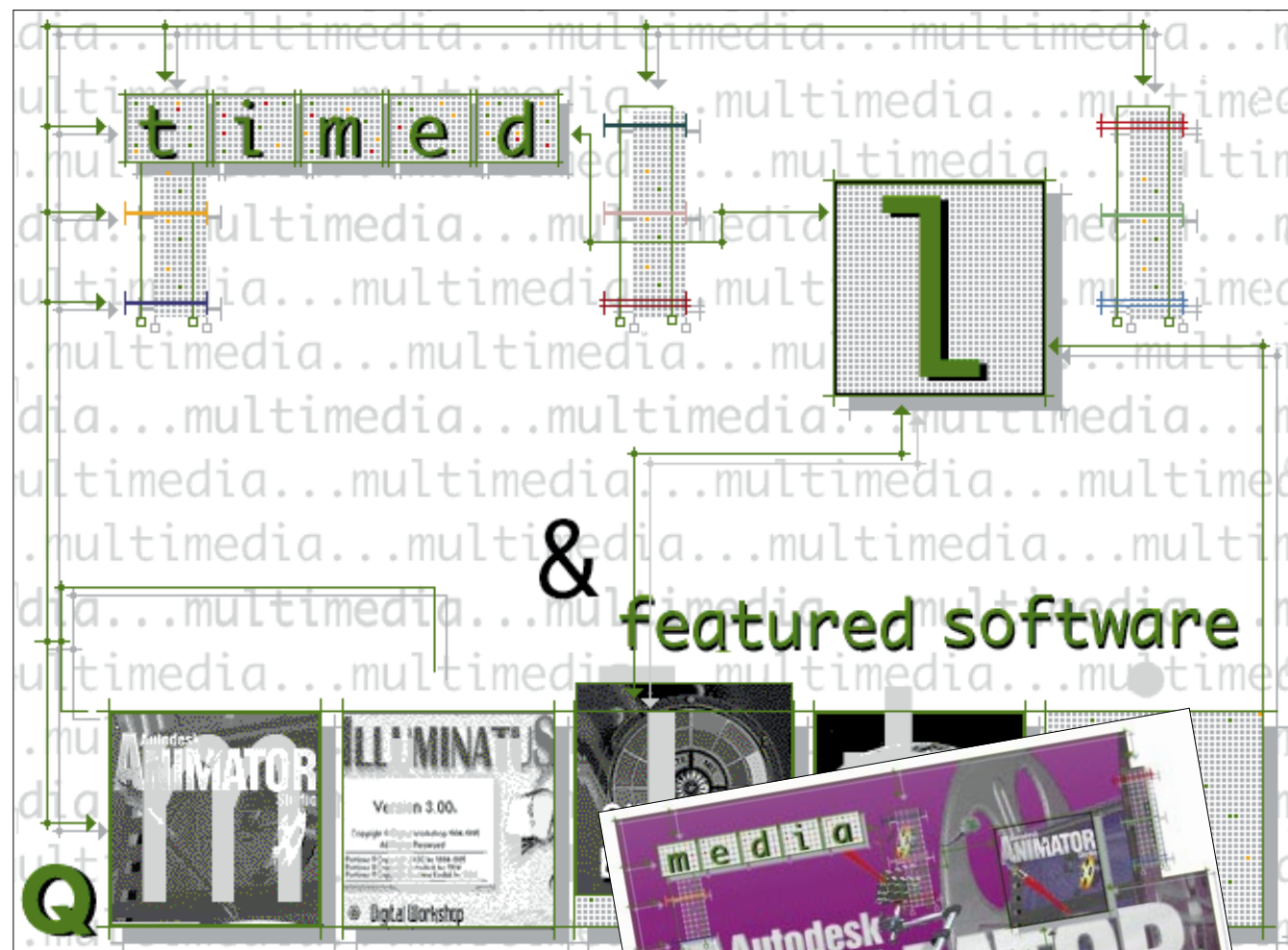
4. Click on main menu. If you don't have Quicktime for Windows and Video for Windows installed, you will be offered the chance to install them before continuing.

● Pressing the *Esc* key at any time quits *PCW* Interactive.

Hardware requirements

To run the CD-ROM you need a PC with Windows 3.1 or later and a colour VGA display. We recommend a multimedia 486 or Pentium PC with a minimum 8Mb of RAM. The optimum configuration is a 16Mb Pentium.

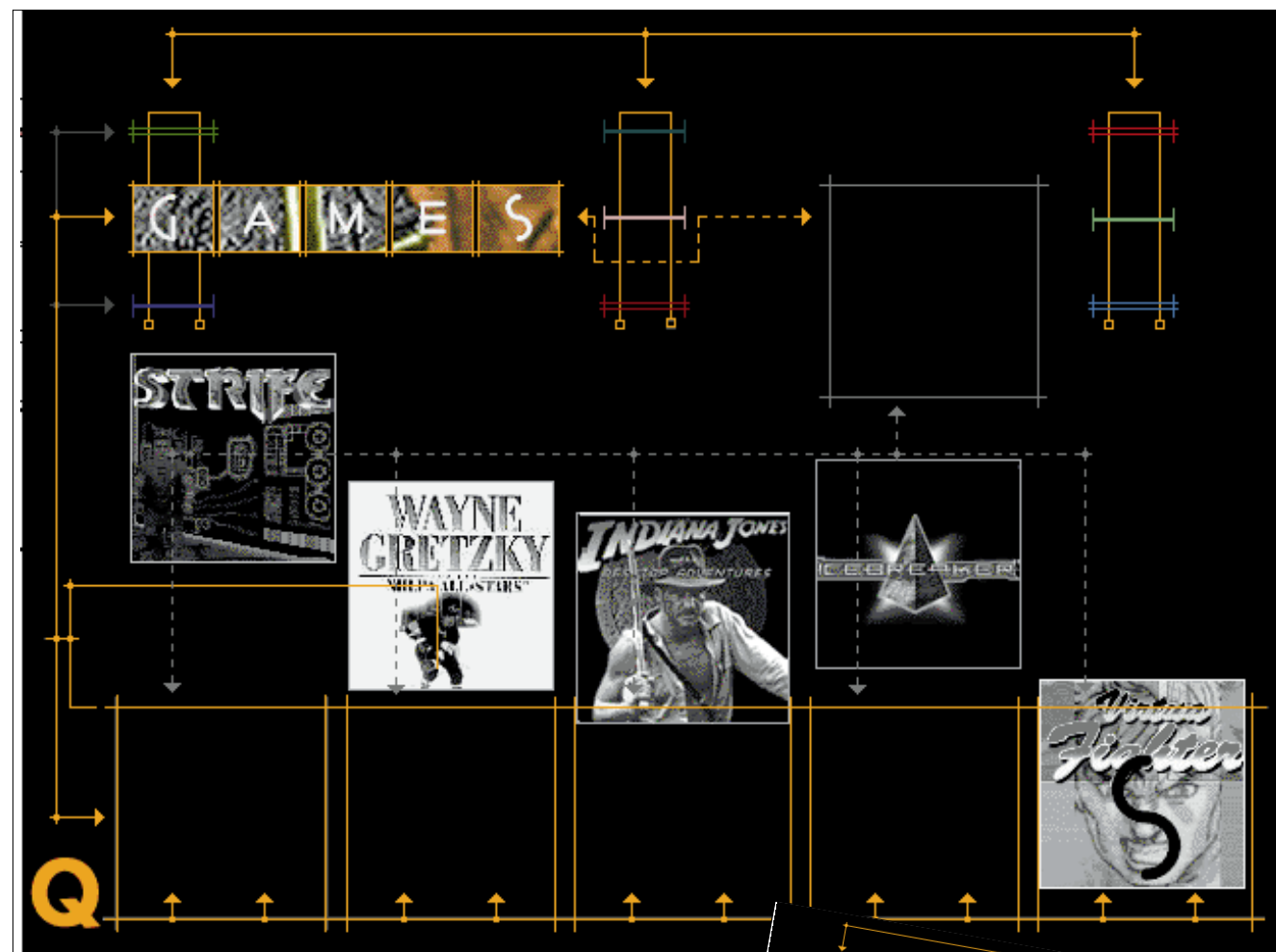
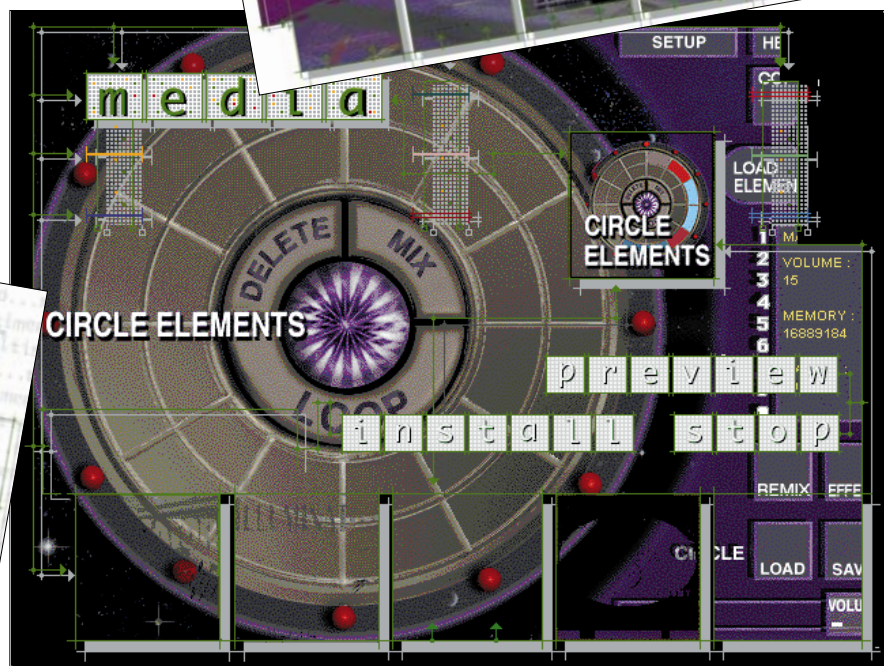




Multimedia

To preview any of the multimedia demonstrations, drag one of the images along the bottom into the box in the top right corner.

- **Autodesk Animator demo.**
- **Redshift**, an exciting interactive exploration of the world of astronomy.
- **Circle Elements** — too complicated to explain here. You'll just have to look at the preview.



Each game has a preview section which tells you a bit about what the game involves



Games

To preview any of the games, just drag one of the images at the bottom of the screen into the empty box in the top right corner.

- **Strife**
Strife picks up where Doom left off by introducing new weapons, an interactive story line and dramatic voice-over. The challenge takes place in a virtual world of 200 square miles and 30 different levels

- of play. Strife is not yet available in the UK.
- **Wayne Gretzky**
Ice hockey excitement named after Canada's best ever player and featuring the NHLPA (National Hockey League) All-Stars.
- **Indiana Jones and his desktop adventures**
Search for valuable hidden treasure with Indiana Jones in this game set in

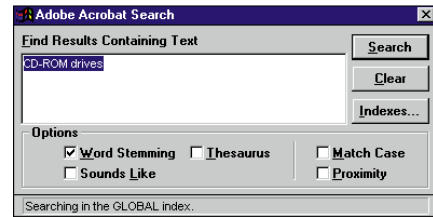
- 1930's Mexico.
- **Icebreaker**
Something a little simpler. This game is about the straightforward business of destroying pyramids, but some pyramids are smart, some are dumb and others are immune even to a plasma blaster.
- **Virtua Fighter Remix**
Exciting martial arts game based on the original Virtua Fighter arcade game.

Using the Hands On section

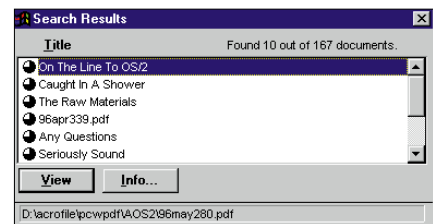
Load Acrobat either by selecting *Hands On* from the launch menu or by going into the *Hands On* section of the main menu.

To search Acrobat files just click on the icon. A dialogue will appear. Just type in the word you want to search for and click the search icon. In a second or so, the search results dialogue will appear containing a list of the files containing that word.

You can then view any of the files. The



Just type in the word you want to search for — CD-ROMs in our case



In a second or two a list of all the files containing that word will appear

word you search for (CD-ROM drives in our example) is highlighted. On average-sized monitors the text will be greeked, but you can use the magnifying glass icon to expand the text. Just click on the icon then select the area of the page you want to magnify, with your mouse.

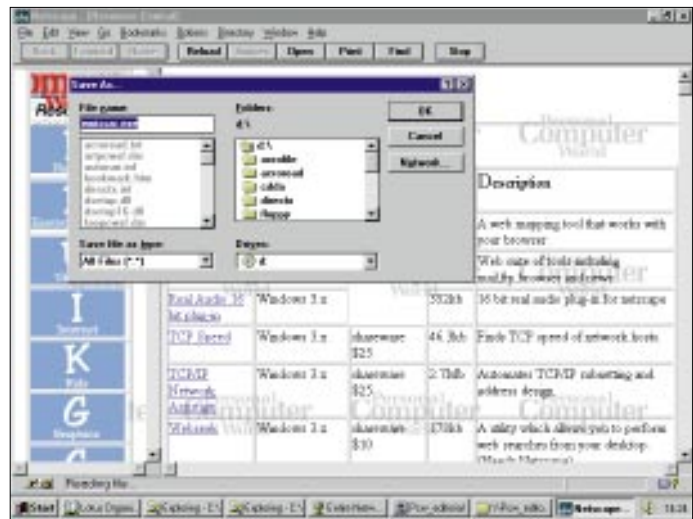
The default index for the Acrobat files is a global search of all files. You should find the global search quite fast enough. If you're looking for a very common word however, such as "Windows", you may want to narrow the search. To do this, click on the indexes button in the search dialogue then click add, and add any additional indexes which have the prefix PDX and are located in

```
<CD Drive>\ACROFILE\PCWPDF\
```

Using the resources section

Because the resources section uses Netscape, files are downloaded just as you would from the World Wide Web. Most files in this section are compressed Zip files or self-extracting archives.

To download a file, click on the hypertext link (the name of the program in blue, underlined type). This will bring up the "save as" dialogue box. You can then



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choose where you want to save the file. It's a good idea to create a directory or folder for it first, using Windows Explorer or file manager.

Avoid copying files into your Windows directory or into the root of drive C:.

Using File Manager, Explorer, or My PC, go to the directory where you've put the file.

Provided you've "installed" and "associated" PKUnzip or Winzip (see *Installing PKUnzip*) or if the file is self-extracting (an .exe file rather than a .zip) you just double-click on the file name to expand it into its component files.

You can then run the program or its installer by double-clicking the file name.

Using Netscape

The *Personal Computer World* Interactive CD-ROM uses Netscape as the delivery mechanism for the resources section and to run the Room e-zine.

If you're on the internet, chances are you're already using Netscape and have a rough idea how it works. If you're not, here's a great opportunity to find out what

this browser business is all about.

You navigate through web (or HTML) pages using hyperlinks. These are images or, more often, *highlighted text* which take you backwards or forwards through different pages. You can also move back and forth through pages you've already visited, by using the back and forward arrows on the toolbar.

Netscape 2.0 also has a feature called "frames". This divides the screen into separate areas. When using frames, the right mouse button is used to move backwards and forwards, rather than the arrow keys.

When using Netscape from within PCW Interactive you'll need to go to File/Exit to return to the main screen.

Installing PKUnzip or Winzip

Zip files are the standard compression format for distributing programs and utilities on the World Wide Web and on floppy disk.

Before you can "unzip" most of the resource files in this section (.zip files) you will need to install PKUnzip or Winzip. Go to the Essential Utilities section and click the link

"PKZip/PKUnzip" or "Winzip".

● **Winzip:** Choose Winzip and a new page will appear, offering you Winzip for Win95 and Winzip for Windows 3.11. Select the appropriate utility then use the "Save As..." dialogue to choose where to save the file.

If you have less than 16Mb of RAM it's probably a good idea to quit Navigator and the PCW CD next. Then use File Manager or Explorer to find Winzip95.exe or wz60wn16.exe.

● **PKUnzip:** Choose Pkunzip and you will be offered the option to save pkz204g.exe onto your hard disk. The C:\DOS\ folder is as good a place as any to save it. After you've quit Navigator and the PCW CD, double-click on the file to expand it into 16 separate files.

● **Associating the file:** Unless you intend to use DOS to unzip files (laborious and tricky) you need to associate .zip files with PKUnzip. From File Manager choose File Associate to associate *.zip files with PKUNZIP.EXE. Under Windows 95, zip files will be associated automatically.

Possible problems with the CD-ROM

1. If you get an error running the game Red Shift, and have a Windows 95 operating system, then check to see which unnecessary tasks you have running in the background (by pressing control, alt and delete) and shut them down.
2. If you have launched Acrobat reader in the *Hands On* section, and cannot find the search icon that is described in the first-page notes, then this may be because you already have a copy of Acrobat reader on your C: drive and so the autostart for this cover disk is not asking you to install our version which includes the search facilities. You can either delete your Acrobat reader from the C: drive, or change its name and run PCW.EXE again, which this time should ask you to install the Acrobat reader with search facilities.
3. In the resources section, the files in the Psion Organiser section are corrupted and will not install properly. We'll put usable versions of the files on next month's CD.

● **If you get a message such as "Not ready reading drive D:" you may have a dud CD. Return it to: TIB House, 11 Edward Street, Bradford DB4 7BH, for a free replacement. For other problems concerning the CD, call 0891 616444. Calls cost 39p/min off-peak and 49p at all other times.**

SEPTEMBER 1996

PCW INTERACTIVE: Entire Contents List



Multimedia section

- Autodesk Animator Studio
- Circle Elements
- Illuminatus
- Red Shift

Games section

- Ice Breaker
- Indiana Jones and his Desktop Adventures
- Strife
- Wayne Gretzky NHL '96

Arts section

- 12 classical MIDI masterpieces from Liszt, Schumann, Granados, Albeniz and Mozart
- 32 graphic images from the Image Bank and Image Bank/ China Tourism Photo Library Alliance
- Image Bank video of "Asian Journey"

Getting Started

- A beginner's interactive exploration of desktop PCs

Focus On

- An introductory tour of our VNU European Labs

Hands On

- Hints, tips and practical advice on every aspect of personal computing

F O L D E R E

The Room

- A browse through VNU's new e-zine

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- GPSS
- Incontat
- Invaders

- Lemonheads
- Meeja
- Nosferatu
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- Payroll Lite
- PKZIP
- Psion Series 3a Emulator for your PC plus
- Quik Menu 4
- Railroad Roman
- Randypap
- Rats
- Real Audio 16-bit plug-in
- Robatic
- Sea School Math Waves
- Slay
- Speedyrom
- TCP Speed
- TCP/IP Network Assistant

- UUENCODE
- VBRUN
- 100,200,300,400
- Web Mapper
- Webseek
- What PC? Mobile Pages for Series 3a
- Winsock Swapper

Reference section

- 15-month products and features archivable database
- Advertisers index
- General info about the CD
- Glossary of computer terms

Wanted: material for PCW cover CD-ROMs

We are always on the lookout for material for our cover-mounted CD-ROMs. If you think you have something that might be suitable — software, pictures, fonts, demos and so on — please let us know. Either email Barrie Maylott (barriem@vnu.co.uk) or call him on 0171 316 9370. Please note that Barrie cannot deal with technical support queries.

Newsprint

NEWSPRINT NEWSPRINT NEWSPRINT NEWSPRINT

Teletext considers TV-based web pages

A new system of piggybacking web pages on to a TV signal marks a new phase in the convergence of computing and television. Intel has proposed the Intercast system as a new standard, as part of a series of measures aimed at speeding up web access.

Intel is also backing plans for a paid-for first-class internet data stream that would guarantee uninterrupted flow.

The Intercast system, to be piloted at the Olympics by NBC, uses the same part of the TV signal as Ceefax and Teletext. This is the Vertical Blanking Interval (VBI) which separates each frame. PCs have already increased the scope of VBI by allowing text to be captured and searched. A company called Norpak (www.norpak.ca) uses VBI to deliver Usenet news.

Intercast adds a whole new dimension to

TV by making it interactive. The screenshot (right), from an Intel promo video, shows a TV broadcast in a PC window, with related hyperlinked information in two other windows.

The Olympics pilot will make available extra details of athletes as they compete. Clearly there will also be much scope for interactive games and advertising. New set-top boxes like the Acorn and the Pippin (see page 104) will bring such interactivity from the desktop to the living room.

A BBC spokeswoman said there were no plans to try Intercast on Ceefax.

Teletext editor Graham Lovelace said his organisation is "superbly positioned" to benefit from a web interface. "Much of the development in this area will have to wait for digital television technology, but there are opportunities now with analogue, too."



The other Intel initiative involves new protocols called RSVP and RTP (Resource Reservation Setup Protocol and Real-time Transport Protocol). RSVP enables applications to set up first-class connections, and RTP governs the transfer of real-time data such as video and audio.

Clive Akass

Corel draws on Barista for Java

All new Corel products will use a technology called Barista which gets round the limitations of HTML by publishing web documents as Java code.

First will be Corel Office Professional, a new £399 32-bit suite which includes Draw 6 and Paradox 7.0 as well as core apps in the WordPerfect 7.0 suite. Beta tests of a Java-based Office suite will start this month.

Corel 0800 581028

First blood is drawn in battle of the superfloppies

Contenders in the battle for a successor to the 1.4Mb floppy were reduced to two last month after Syquest tacitly ceded defeat, badly hit by the success of Iomega's 100Mb Zip drive. Syquest marketing chief, Andreas Helios, admitted that his rival 135Mb EZ-135 will be phased in in the coming months.

He spoke shortly before Compaq launched its new Deskpro range in Britain, some fitted with the new

LS-120 drive which takes 120Mb disks. This can read standard floppies, unlike the Zip, but is reported to be slower. It may have come too late to corner the superfloppy market.

Several PC makers have said they will ship machines with internal Zips. They include Packard Bell, H-P, Acer, IBM, NEC and Bandai.

Syquest will focus on its new £206 230Mb EZFlyer which reads and writes EZ-135 disks, and is part of a planned range of backward compatibles.

Helios said pitching the EZ-135 against the Zip had been a mistake as its expensive hard-disk technology could not compete on price. But 700,000 EZ-135 drives had been sold and about 300,000 more will be made. Ironically, Syquest has announced a price cut to just £89 for all versions of the EZ-

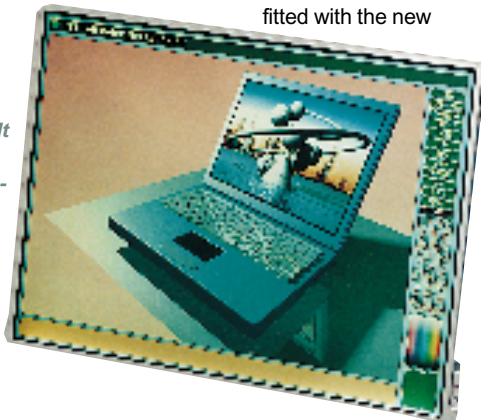
135, despite reports that it was losing \$40 a drive and had to raise \$20 million to keep parts flowing for production.

"The he 230, is positioned at the SoHo market where people want both performance and capacity. We believe there will be a tough fight at the consumer level and we are pleased to be out of it," Helios said.

Iomega has just lopped \$100 from its 1Gb Jaz drive in the US, in anticipation of Syquest's 1.3Gb Syjet. Helios confirmed reports of a bug with beta versions of the Syjet but said it will ship as scheduled in Europe in late September. Clive Akass

Syquest 0800 526559; Iomega 0800 898563

NEC claims this is the first 13.3in colour TFT notebook screen. It will give the next generation of high-end notebooks a display size approaching that of a 15in VDU. It will sample in September at £1,170 a shot.



●●● STOP PRESS ●●●
Microsoft was reported to be about to post a beta version of Visual J++, a Java development environment, at www.microsoft.com

Amstrad deal could put Psion palmtop on air

Psion was keeping its cards close to its chest last month over its negotiations to buy sections of Alan Sugar's Amstrad.

The deal, forecast to be worth about £234 million, would mark Sugar's departure from the UK PC market, which he helped create with the launch of the Amstrad PC 1512 in 1986.

It could also signal the direction Psion will take with a successor to its world-beating Psion 3a organiser, a relatively

old design under challenge by the likes of the Palm Pilot (see First Impressions) and the Nokia 9000 palmtop cellphone.

Psion is most interested in Amstrad's mobile telephone arm, which is based on Sugar's acquisition of cellular specialist DanCall. An add-on already allows the 3a to be linked to a cellular net, but DanCall knowhow could let Psion produce a Nokia-style integrated device.

The future of PC maker Viglen, bought by Amstrad last

year, was unknown as we went to press. Psion has rejected Amstrad's consumer electronics division as "a very small part of the strategy".

Psion spokesman Steve Pang said the precise terms of the deal awaited the outcome of a court case which would affect the value of the company.

Sugar is involved in a nasty litigation with England soccer manager Terry Venables, who is riding high in the popularity charts following his team's good showing in Euro96.

Also about to come to a head is a long-running dispute with Western Digital... see *Rise and fall of the house of Sugar*, page 34.

Short Stories

Borland launches Java Delphi

● Borland has two development tools in the pipeline to bring to the Web the style of graphical programming it intro-

Latté

duced with Delphi. Latté, due out this autumn, is targeted at developers of downloadable Java components. Coming later is Intra, aimed at PC office-suite, spreadsheet and database application developers wishing to use JavaScript for less complex tasks such as form creation.

Borland 01734 320017



Flash new memory chips

These flash-memory cards are the smallest available at just 38mm x 33mm x 3.5mm and could be used in palmtop computers, digital cameras, cellular phones and digital audio recorders. One 2Mb module will hold an average of 34 photos and can be refreshed 100,000 times – equivalent to 3,400,000 pictures. Intel is shipping 2Mb and 4Mb modules at about \$100 per 2Mb.



Online greetings

● A Cambridge company is offering D-I-Y greetings cards at www.cybercard.co.uk. You can choose from pictures and text to suit various occasions, and the cards are printed and sent to order. Cybercard's David Bridge said the service had already proved popular with people wishing to send cards from abroad. Prices start at £1.99.

Act! for Notes

● Symantec has released a Notes version of its Act! contact management pack which it claims combines the best features of both products.

Symantec 01628 592320



IBM sees infra-red

● IBM Microelectronics has launched an infra-red chipset supporting data transfer at 4Mbit/sec. Bulk price of a paired transceiver and controller is \$13. Details at www.ibm.chips.com.

Mexican thesaurus gets a chilli reception

Microsoft launched a UK online publishing venture last month amid embarrassing allegations of cultural insensitivity over the Spanish-language thesaurus in the Mexican version of Word. It defined "woman" as "doncella", meaning servant or virgin, and "homosexual" as "perverted and deviant".

A "westerner" was deemed to be "a European man, Aryan, white, civilised and cultured." Whereas alternative words for Indian included man-eater, savage, barbarian and kaffir.

The product caused uproar in Mexico, where many of the population are Aztec and Mayan Indians. Microsoft apologised, and blamed the insulting

translations on the use of an old dictionary.

Microsoft is no stranger to culture clashes. The middle-American perspectives in its Encarta

encyclopedia do not all travel well, so the company has brought out localised versions.

It is taking no chances with its UK online publication, which follows the launch of its *Slate* (www.slate.com) magazine in the US. The Mexican thesaurus row coincided with a series of adverts for British journalists. So perhaps we will be spared reports of the British Army dressed in woad, being blessed by the Arch-druid of Canterbury.

● *Slate review* — see *Cutting Edge*, page 202.



Cyrix 'will stay ahead of Intel'

Cyrix, buoyant from figures showing its 6x86 chips trouncing Pentiums in speed tests, will sample its next-generation M2 chip in October and claims it will beat Intel's Pentium Pro.

The M2 will include support for the MMX extensions: 57 additions to the Intel x86 instruction set designed to boost multimedia performance by 50 percent to 300 percent.

Intel will include MMX in new Pentiums and Pentium Pros, including a cut-down consumer version, from later this year (see below). Cyrix chips are made by



IBM, which also badges some under its own brand.

Both companies measure their chips by a P rating based on what they reckon is an equivalent Pentium. Thus, the P200+ 6x86 runs at 150MHz but is rated as 200MHz Pentium class.

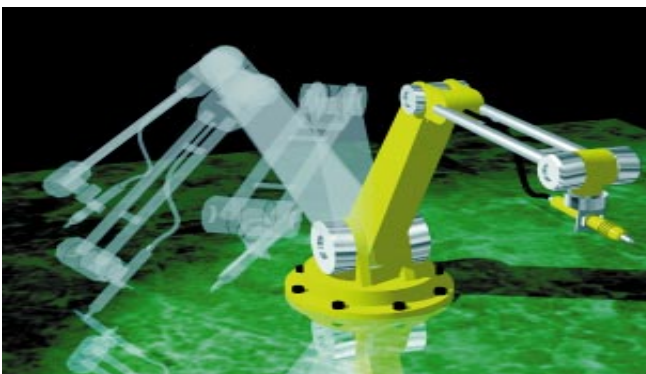
An unoptimised Cyrix P200-based system beat six 200MHz

Pentium systems in our tests (PCW, August). Brendan Sherry, general manager of Cyrix Europe, told me: "We will be starting the M2 at 180MHz or 200MHz and drive the speed up to 300MHz, which will give P ratings in excess of 450."

AMD is reported to have licensed MMX technology. Sherry said Cyrix has no need to do so, despite the FUD (fear, uncertainty and doubt) spread by Intel. "Nothing in M2 will be licensed. It does not need to be if you have an original design, delivering the functionality." **Clive Akass**

● See News Analysis, page 40.

Giving CAD a whirl



This vivid graphic of a robot in motion was produced by Dynamic Designer Motion, a bolt-on for AutoCAD distributed by Autodesk specialist, Force 2. The product is one of a range developed by Design Technologies International to allow users to model, visualise and test dynamic mechanical designs.

Force 2; 01844 261872

Cyrix powers sub-\$500 Windows PC

An impressive sub-\$500 Windows PC from Acer has made its debut in Taiwan.

The PC is designed to use any 486 chip but the prototype was based on a Cyrix 5X86. Depending on demand, the AcerBasic will come with a 100MHz or 133MHz Cyrix or IBM, or an AMD CPU. The machines come with a 1.44Mb 3.5in floppy and 4Mb of DRAM. Bundled software includes DOS,

Windows 3.1, Acer's Basic Net internet browser, games and education programs.

This is not a stripped-down diskless PC as Oracle's Larry Ellison envisions, nor a loaded multimedia PC at the \$1,000 range. Acer's original positioning as a low-cost PC for the Asian market makes a lot of sense and could help them become the major player in that market. However, it could also reach new markets in Europe, South America and Africa. You can bet that all of the big players will be keeping their eye on this PC.

Tim Bjarin

Tim Bjarin reports from the U.S.

Nintendo came to Silicon Valley to show off its new game system, the one I couldn't see at E3 in May for the rush of kids looking at it.

I'd doubted whether such devices would be able to compete this Christmas against PCs with the new 3D graphic boosters. But I have to admit that Nintendo's \$250 workstation-class device is compelling.

The new version of Super Mario Brothers is awesome on this 3D Super NES game player. Using the Silicon Graphics chipset, a special 3D accelerator, images compare easily to \$30,000 displays.

The Japanese snapped up 200,000 within four hours of the machine having hit the market, but it will not reach Europe until early next year.

● About three years ago I got a call from a Gilbert Hyatt, who claimed he invented the microchip. I doubted this, but it turns out that he filed a patent claim, in 1970, which was awarded to him in 1990. He said that this preceded claims by Texas Instruments (TI) and Intel, and that he was owed back royalties.

Intel and TI fought his claim but many Japanese companies agreed to pay him millions. Well, in late June, the US Patent Office declared TI's Gary W. Boone as the inventor. Hyatt reportedly plans to appeal.

● It seems there's been a breakthrough in negotiations on DVD copy protection. Sources say that there is no longer any real dissension on principle and negotiators are working on three standards for copy protection, covering: digital-to-digital, digital-to-analog, and analog-to-digital.

All-digital copying will probably be covered by encryption but a hardware solution might be required for digital-to-analog to satisfy all sides.

Work is only just starting, so DVD players are unlikely to get into the market this year, as expected. 1997 will be the year they start to make any impact.

Home Pentium Pro chip set for 1997 launch

A consumer version of the Pentium Pro, codenamed Klamath, will appear in early 1997 according to the US Microprocessor Report. It will lack the integrated Level 2 cache that distinguishes the Pentium Pro, giving system builders greater flexibility in the use of external cache.

Klamath will be tweaked to improve 16-bit performance over the Pentium Pro, which actually runs 16-bit Win3.x applications slower than the Pentium. It will be clocked at up to 266MHz.

Klamath will be made by Intel's well-tried 0.28 micron process and, according to rival Cyrix's Brendan Sherry, will sit on its own daughterboard. A faster 0.25-micron version, codenamed Deschutes, will follow.

Merced (all these codenames are US rivers), set for late 1998, is the 64-bit chip that Intel is developing with Hewlett-Packard. It is better known as the P7, but Sherry does not believe it will be Intel's main offering (see News Analysis, page 40). H-P is said to be working already on a P8 chip.

Short Stories



● A new package from Sage enables lawyers and others charging time-based fees to gloat about how much they are earning with each passing second spent with a client.

But realtime display of charges is just a minor party-piece for Timeslips, a British version of a US market-leading system which facilitates accurate billing of up to 30,000 clients.

It will produce a variety of custom or templated reports. Sage bought US developer, Timeslips, two years ago. Timeslips costs £300; networked prices start at £700.

Sage 0191 2553000

Reflex splits up security suite

● Reflex Magnetics is selling as standalones three PC security programs which were previously available only as part of its Disknet suites.

They are Disk Controller, for floppy authorisation and scanning; System Protector, for preventing infection by unknown viruses; and Data Encryptor, a 64-bit key encryption package to protect sensitive information.

Reflex 0171 372 6666

Don't send us your old PCs!

● The August issue of *PCW* stated that The Computability Centre, Warwick, accepts unwanted computer equipment and supplies it to the disabled (*A New Lease of Life*, page 183).

The centre does indeed advise disabled people on the use of computers, but it does not provide or accept actual equipment.

Freephone advice line 0800 269545

Oh Brother! Inkjets and lasers get good and cheap

Low-priced models from Epson and Brother have tightened competition in the personal printer market. Epson's Stylus Color 500 is a four-colour 720dpi inkjet replacing the Stylus Color II. With bi-directional parallel and Mac serial ports, it is targeted at PC and Mac SoHo users.

The 500, with an expected street price of around £250, is said to have better ink to cut drying time, better colour matching features, and driver enhancements that ensure a faster return to your application.

Brother has launched a new range of personal lasers to replace its 600 series. The new 700 series models have been scaled down both in size and price, with the entry-level HL-730 featuring 600dpi quality output, a 200-sheet paper feed and a first page print speed of 20 seconds. The HL-730 has an expected street price of around £300; just



£50 more than Epson's Color 500.

Next in Brother's series is the HL-760, a much quicker printer with a higher resolution output of 1,200 x 600dpi. Like its predecessor, it uses a combination of

GDI technology and PLC5e. It has an expected street price of £350.

Eleanor Turton-Hill

● See our *Stylus Color 500* review, *First Impressions*, page 74.

Card makers dream of a 3D Christmas

A year ago, affordable 3D graphics cards for home users didn't exist. The nearest you could get was the Matrox Millennium, but it lacked texture mapping and was aimed at the business CAD market. But now, all major graphics card makers have released, or will soon release, 3D-enabled devices. Their target: the home games user.

The drive for 3D seems to have been fuelled not by the demands of DTP and CAD users, but by the near-insatiable appetite of PC game players. Ever since Gates's purchase of RenderMorphics and its Reality Lab technology, now incorporated into Microsoft's Direct3D programming interface, there's been a tremendous push to get out cards to capitalise on the new 3D games market.

The irony is that almost all manufacturers

released cards before Direct3D was ready (due to delays in its development at Microsoft). This left them with no choice but to have 3D games designed to run solely with their 3D graphics engine. As a result, a temporary battle has

erupted as vendors offer competing "out of the box experience" games packages.

The question that remains is, when will Direct3D games be available? Microsoft says it will release two Direct3D games, *Hellbender* and *Monster Truck Madness*, at ECTS in mid-September. Matrox has said that it expects about 50 Direct3D-enabled games to be ready in time for the Christmas buying season — other industry sources confirm this. With manufacturers ATI, Matrox, Orchid, Number Nine, Hercules, Creative Labs, Diamond, Video Logic and ELSA all having announced product, the competition is expected to be intense.

Dylan Armbrust

3D board makers

ATI 01235 833666
 Creative Labs 01245 265265
 Diamond Multimedia 01189 444400
 ELSA (Force 2 Int'l Dist. 01844 261872)
 Hercules (Imago Micro 01635 861122)
 Matrox 01793 441100
 Orchid 01256 479898
 Video Logic 01923 260511
 Microsoft 0345 002000



Short Stories

I hear what you're saying

● Oxford University Press and Philips Dictation Systems (PDS) are to collaborate on the development of vocabularies for natural speech-recognition products.

PDS claims to have the only commercial natural speech recognition system, currently available on networks for specialised uses such as radiology reports. It enables text dictation directly into a computer without the need to enunciate words separately.

Philips Dictation Systems 01206 755600

Firewall 2.1

● The new version 2.1 of Checkpoint Software Technology's Firewall-1 claims to provide completely secure remote access to networks.

Firewall-1 2.1 also boasts internet and intranet gateway support for Windows NT and Windows 95, and extended application support for RealAudio, VDOLive, Internet Phone and Oracle SQNet.

Integralis 01734 306 060

Psion floppy

● Purple Software has launched Cyclone, a portable floppy disk drive for the Psion organiser. It uses standard floppies which can be used to swap files with a PC and costs £169.95.

Contact 0171 387 7777

Microsoft faces EC price probe

The EC is investigating claims that discounts on software sold to big vendors for bundling with machines risk crippling smaller PC makers.

Reports in *Personal Computer World* were praised by Graham Watson MEP (Lib-Dem, Somerset and N. Devon), when he raised the matter in the European parliament. He said: "The allegations... are certainly reported very bravely in view of the possible loss of advertising."

In a written question, he asked: "Is the Commission aware that Microsoft is exploiting its monopolistic position in the

computer software market to the detriment of European suppliers and users?"

He cited claims that Microsoft sells Office to some US suppliers for \$80 (approx £50) per package, while charging smaller European competitors £140.

The EC also received complaints from the Personal Computer Association.

Commissioner Karel Van Miert stressed that price issues were complex. And he said: "We are particularly concerned where abusive behaviour by a dominant firm may be impairing



MEP Watson: praise for PCW

the ability of its European customers to compete."

An investigation into pricing policies and discussions with Microsoft are under way.

Mr Watson suggested that the EC consider using "adverse publicity and perhaps financial penalties" to deter unfair pricing.

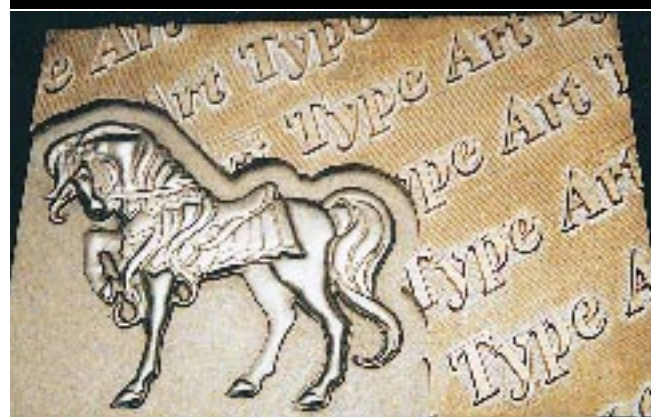
Microsoft's Brad Smith said that original press reports were misleading in suggesting that Microsoft gave discounts to US firms. "We do have volume discounts... The same is true whether you're buying computers, cars or refrigerators."

He said Microsoft offers significant advantages to small vendors "such as setting up special delivery channels."

Gideon Easterman, managing director of PC maker Dan Technology, said: "We believe that Gateway and Dell are getting a preferential price on Office software. This is clearly manifested in magazine advertising."

Jessica Hodgson

What a relief!



This bas-relief was produced by Type Art, a French package which translates drawings into engraving-machine instructions. Details from Patrick Renaud, Visual Numeric, at 00 33 74 70 80 00.

Escom's High Street dream turns sour

Escom UK closed one in four of its high street stores just a year after launching them as a revolution in UK computer sales — and shortly before the German parent company filed for protection from creditors.

Escom UK denied the closures were connected with the German problems and managing director Geoff Saunders said a management buyout was a "distinct possibility".

The closure of 65 of the 234 Escom shops left many customers wondering where they would get local support. An Escom spokesman said the company would continue to supply all products, and that technical support would not be affected. Where local

stores have closed and alternatives are hard to reach, the company will arrange direct delivery.

The Escom UK chain consisted for the most part of Rumbelows shops, taken over from Thorn/EMI last year. Escom boasted that it would install trained staff to give a higher class of support than could be offered by High Street rivals like Dixons. In the following months there were signs that Escom had overextended, but it claimed to have overcome organisational problems. There were reports of staff bundling unlicensed software with PCs to secure sales.

One staff member who called the PCW

offices just after he was sacked, said a security guard delivered notices to quit. He claimed he had received no training and said many Escom shops had not been making enough money to pay wages.

He believed the closures were due to the fact that Escom had to pay Thorn/EMI rent, having had the shops rent-free for a year. This was denied by Escom.

Saunders said: "The company is now ideally placed to fully exploit the potential of the UK market." The closures, affecting "secondary and tertiary sites", were designed to make the company "leaner and fitter".

Jessica Hodgson

Up-and-ATM takes on 1Gb Ethernet in battle of the nets

Two ultra-fast net technologies competed for attention at the Networks Show, as the continuing NC-v-PC debate (see page 104) highlighted the need for higher bandwidth.

K-Net, using products from Fore Systems, set up a 60-screen TV channel for the show using 155Mbps ATM (Asynchronous Transfer Mode). Also on show were 100Mb/sec fast Ethernet products, with which ATM is incompatible.

ATM's big advantage over Ethernet is that it can guarantee continuous bandwidth, making it more suitable for links using multimedia data. It is also faster. The disadvantage is that it is costly, requiring the replacement of much existing network infrastructure.

ATM is still very much a minority sport but

exhibitors seemed confident that it would gain market strength over the next 18 months. Many were selling both products, and with flexible upgrade paths.

One product, the Megaswitch II from Nbase, offers 12 autosensing 10Mbit/sec or 100Mbit/sec Ethernet ports with a choice of ATM or 1Gb/sec Etherlink backbone modules.

Marketing VP Avi Rappaport said he believed 1Gb Ethernet could offer a better alternative in corporate backbones because it was compatible with existing hardware and was easier to manage and install.

He added: "ATM has its uses and the Megaswitch will support both. We are not trying to escape the technology."

Nbase US 972 4 993 6200; www.nbase.com

Network Shorts

New port has yet to make a storm

● Among all the thousands of new products at Networks was one that will change PC computing as much or more than any other at the show — and it went almost unnoticed.

The tiny Universal Serial Bus (USB) connector was on show at the Cabcon stand, where sales manager Alan Greenwood said very few people had taken an interest.

The USB will appear on all Intel motherboards from the end of this year and is expected to replace the serial and parallel ports, not to mention the keyboard and mouse connectors.

It offers a 12Mbit/sec serial connection, and USB devices can be daisy-chained SCSI-style. It also offers a power supply, so can act as a universal docking port for mobiles.

Greenwood said he had hoped to interest equipment manufacturers in the USB. "Few of them seem to know anything about it," he said.

Cancon 0181 547 3133



Triple-function PC cards on-line

● More multi-function PC Cards will become available as new specifications come into force, according to Portable Add-ons. Sales director Grant Lumley said cards could be expected with three or even more functions. The first would probably be a combined Ethernet card, modem and cellular phone link.

Portable Add-ons already offers a range of dual-function cards including the FreeSpirit combined GSM link and modem (pictured).

Portable Add-ons 01483 241333

NC contender — or pretender?



Plexcom is yet another company claiming to have invented the network computer before Oracle's Larry Ellison. Its QuantumNet architecture bears only a passing resemblance to the NC spec, however. It puts all the guts of the net stations on cards in a central chassis, providing many of the security and maintenance advantages of the NC.

Plexcom 01582 833212

● See feature, page 104

Many routes to ISDN

Digi International offered 30 days' free ISDN web access with its £350 Datafire card, which gives local networks basic-rate access.

Farallon offered two Netopia routers, with integrated Ethernet and Mac LocalTalk support and designed for easy setup.

The £1,315 model 440 comes with PC and Mac Internet client software; the more limited £1,024 model 330 lacks the software.

Interguard (Digi distributor)

01753 536464;

Farallon 0181 758 7546

More jump on V34-plus netwagon

More companies are offering 33.6Kbps modems in anticipation of a ratification of the unofficial V.34-plus standard, which boosts the maximum data rate for a modem from 28.8Kbps.

Motorola has introduced a V.34-plus version of its 28.8 3400 modem, which won a PCW award this year. The new Premier has a suggested price of £242 (excl. VAT); the 3400 can be bought for less than £170.

Motorola also announced a 28.8 card modem (pictured) approved for use in 21 countries in Europe. The 28.8 Pro will cost



£191 (excl. VAT).

Creative Labs is offering two modem bundles based on its PhoneBlaster telephony package, both lacking the latter's integrated 16-bit SoundBlaster card. InternetBlaster offers a 28.8 faxmodem with Web software for £149; ModemBlaster includes telephony software for £199. US Robotics, the first to introduce a 33.6 model, has introduced a V34-plus version of its Sportster with full-duplex speakerphone for £199.

Motorola 01293 404343; Creative Labs 01734 344322; US Robotics 01734 228200

Threats by email raises concern over trial web kits

An email harassment has raised fears that free trial subscriptions to the internet are being abused.

An account which Atlas Internet obtained through *CD-ROM Magazine* was used to mail-bomb user, Tom Moore, with accusations of paedophilia and death threats by someone who apparently objected to political statements he made in a Usenet newsgroup.

One email said: "We're coming to kill you Tom... We will kill you and watch you die slowly as only a paedophile like you deserves." His mailing service, Spuddytalk, was subsequently bombarded with 70Mb of

material from mailers. Mr Moore said the volume of emails was a nuisance but he did not feel threatened by the content. He chastised service providers for showing "a lack of enthusiasm to deal with my problem."

Atlas could not identify the source. Nor could it stop the account because of contractual obligations to *CD-ROM Magazine*. Mercury, the network provider, operates a nuisance call bureau but it is only open to Mercury users.

Mr Moore claimed Atlas was unwilling to help him. Atlas's Justin Fielder said: "Tracing is a complicated process and cannot be carried out after an account is

closed. All Internet service providers are potentially open to this abuse."

It is an offence under the 1984 Telecommunications Act to send abusive email, but the Data Protection Act also prevents network providers from revealing the identity of an account holder unless instructed by the police.

Shez Hamill, chairman of the Internet Service Providers' Association, said: "There is a potential problem with these trial accounts. Atlas is a responsible service provider, but we must stress that unsolicited email may fall outside the grasp of the law."

Jessica Hodgson



● Datalux has launched the Active Matrix 10.4in LCD, a space-saving monitor with optional capacitive or resistive touch screen. The LMV10 is priced at £1,100 (plus VAT).
Datalux International 44 (0) 1293 54 00 92

Quick on the law

● The new UK version of Quicken Family Lawyer lets you prepare your own legally binding Will and Power of Attorney without incurring legal fees. The software has been designed by a team of solicitors and is claimed to be easy-to-use and up-to-date to reflect current law. It costs £29 (plus £5 shipping and handling charge).

Parsons Technology 0800 289041

Reflex action on projector sale

● Conferencing specialist Reflex Technologies is offering thousands of pounds off demonstration models of LCD projectors and panels used in presentations, complete with a year's warranty. The company hires out presentation equipment and customises video-conferencing sites.

Reflex 01734 313611

Light scanner

● Plustek is shipping the OpticPro 4800P A4 full colour scanner for £199 (plus VAT). It weighs 4.9kg and is said to fit into a briefcase.

Solution Point 0345 400300

Long-life PC

● The UCP Eco, from Incaa, is a 486SLC-based computer with no moving parts and a claimed fault-free life of more than 50 years. It is designed for embedded applications such as data acquisition and control. Prices start at £740.

Incaa 01234 720144

XpertRules, OK

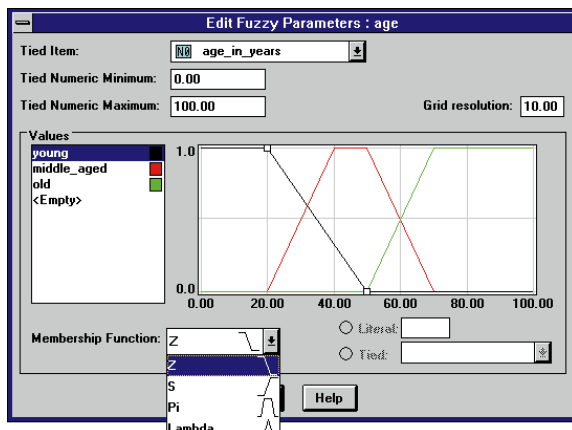
The latest version of Attar Software's XpertRule 3.5 includes fuzzy logic to help in tasks such as performance assessment and diagnostics.

Non-fuzzy logic might require a threshold of tallness to decide whether a particular person is tall. If this is set at 180cm, the implication is that a 179.9cm person is not tall.

The picture shows how the attribute "Age" can be described as being fuzzy using sliding scales. Here, 15 is considered "young", while 37 is partly "young" and partly "middle aged".

XpertRule 3.5 updates are available for £150 by mail or for £120 from www.attar.com.

Attar 01942 608844



Demon bedevilled by support issue

Demon has been accused of incompetence, "cover-up and denial" over support after acquiring net provider Cityscape.

Cityscape user, Atlantic Consulting, claims it lost customers in a round of buck-passing after it had complained to Cityscape of problems with its registration web pages following the switch to Demon.

Atlantic's Matthew Wooller said: "I was shocked to be told by the help desk that there was

a problem, but Demon could do nothing about it because it was a Cityscape problem."

Wooller claims support staff also blamed Atlantic. "The excuses ranged from: 'Well, I don't know what's on the server' to 'We've been trying to get through to the Cityscape people ourselves and they're not replying'. The buck kept getting passed from person to person."

Demon marketing manager, James Gardiner, said: "It's a blip

due to an office move rather than a quality of support issue. We will shortly be launching 24-hour support."

● Demon's new "high quality, low cost" pricing structure will reduce the cost of a 250Mb web site from £750 per month to £300 per month, the company claims. Existing customers will automatically be charged at the new rate. The service will make full access logs available.

Demon 0181 371 1234

Short Stories



● Pastel, which says its accounts package is the topseller south of the equator, has joined UK payroll specialist MAP to take on market leader, Sage, in Britain.

MAPpastel 4.1 is pitched as a cheaper rival to Sage Sterling, and offers extras such as multi-currency facilities. It also serves as a Windows upgrade for users of MAP's DOS accounts suites.

Single-user prices start at £200 for the book-keeper pack. General manager Kevin Lief said: "This is a well-trying, stable, package that has been around for a long time."

MAPpastel 0161 6245662

IMSI offers entry-level TurboCAD

● TurboCAD Designer 2D/3D is a £34.95 (plus VAT) entry-level version of the professional TurboCAD package. It includes powerful tools such as 3D modelling with quick shade rendering and automatic dimensioning.

IMSI has put a free 90-day trial version of TurboProject, its £99.95 (plus VAT) project management package, on its web site.

IMSI 0181 581 2000; www.imsisoft.com

Home help

● The Health and Safety Executive has published a leaflet on health risks and the law, for people working at home and their employers. Copies (ref. IND[G]226[L]) are available free.

HSE Books 01787 881165; or www.open.gov.uk/hse/hsehome.htm

Postcode 4.0

● AFD Software claims Postcode 4.0 (£154 plus VAT) provides more features in less disk space than predecessors. It can pinpoint a near full address from a postcode.

AFD 01294 823221

Rise and fall of the house of Sugar

Special report by
BARRY FOX

A US law suit throws a fascinating sidelight on to the dramatic rise and decline of Alan Sugar's Amstrad. The case has been simmering for years but is now close to a hearing.

Amstrad is claiming \$141m from Western Digital (WD) for allegedly damaging its reputation by supplying faulty hard drives. WD says any fault stemmed from Amstrad's design and it is counterclaiming \$15m for defamation. WD's lawyers are seeking evidence that Amstrad's reputation was not so good anyway.

Amstrad helped create the home PC market in Britain with the launch of the affordable PC-1512 in 1986. By 1988 Amstrad had a 47 percent share of the UK market for first-generation XT PCs and a 15 percent share of the total PC market in Western Europe.

In 1988, Amstrad was preparing to launch its PC-2000 series and expected to sell 250,000 PC-2286 models. Dealers had to pay £250 for the right to sell them.

In April that year Amstrad ordered 49,000 40Mb drives from Western Digital to be shipped direct to Orion Electric, Amstrad's sub-contractor in Korea. The order was soon increased to 91,000 drives.

In June the following year, 30 out of 100 computers tested at Amstrad's factory in Shoe-buryness failed, the company



Happy days: Sugar flogging the £399 Amstrad PC-1512

claims. It initially blamed the Flare controllers, and ordered 100,000 controllers (at a cost of \$8m) from WD.

The following month, Amstrad started to recall 3,000 PC-2286 PCs to swap controllers. By November it still found a 30 percent failure rate on the drives, leaving it without enough PCs to sell for the Christmas season, Amstrad says. Distributors, dealers and customers became "increasingly frustrated and impatient".

In early 1990 WD supplied new drives but around one in

four failed. In April Amstrad tested ten finished 2286s and all ten failed. By July 1990 the failure rate was 20 percent. In May, Amstrad cancelled the contract, blaming a series of defects including tilted heads and inaccurate spindle speed.

Amstrad's pre-tax profit was £135.7m in 1987 and £160.4m in 1988. But profits fell to £76.6m in 1989, and to £43.7m in 1990 — falls which Amstrad blames on a loss of "goodwill and reputation".

In his 1990 book *Alan Sugar, The Amstrad Story*, David Thomas blames the PC-2000 problems on a faulty disk controller designed by a company subcontracted by Amstrad.

WD's response to Amstrad's writ gives a broadly similar explanation, with more detail, and flatly denies almost everything in Amstrad's statement. It accuses Amstrad of negligence, claiming that the UK company "frustrated and hindered" WD and failed to inspect products quickly enough.

WD claims there was too little air circulation in the PC-2286 and that operating temperatures exceeded 51°C, one degree higher than the drives' specified maximum. It claims damages for the cost of re-designing and repairing drives when it was unaware of these facts.

The case is expected to come to court in California this winter, and promises to be an entertaining spectacle.



First Division: virtual reality in the real world

VR for professionals

Division claims that dVISE for Windows NT is the first industrial-strength virtual-reality software for the PC.

It is functionally identical to the product used on Silicon Graphics and Hewlett-Packard workstations for virtual prototyping and simulations. Ford uses dVISE to test the arm reach and view of differently-sized people in car designs. dVISE costs £2,000.

Joanna Scott

Division 01454 615554

Short Stories

Claris offers web frame-up

● Apple-owned Claris's new web authoring package, Home Page, enables Mac users to create WYSIWYG tables, frames and drag-and-drop libraries. It will also support Java.

Claris says it is committed to Home Page's cross-platform compatibility. It is available for Windows 95 and NT as well as the Mac.

Claris UK manager, Tony Speakman, said Home Page was designed to be "both a very powerful tool for the expert and a simple tool for the novice".

At an estimated price of £99, Home Page is in direct competition to Microsoft's FrontPage but lacks its server.

Claris 0181 756 0101

Notebooks in class war

● Eleven hundred teachers in 569 schools have been given multimedia portable computers to evaluate for classroom use. The machines include both Macs and PCs and are equipped with internet access.

Draw 7.0

● Corel has released a Mac version of Draw 6.0 which it says will, for the first time, enable Mac users to easily swap graphics files with the PC.

Data publisher

● Information from Mac-based Filemaker Pro databases can be made available to web users, using a new product from Eurosource. Tango for Filemaker, which costs £275 per server, will be available later this month.

Eurosource 0181 561 1993

Newsprint welcomes feedback. Send your news and views to clive_akass@pcw.cmail.com, compuserve.com or fax 0171 316 9313

Breakthrough art package signals fears for the Mac

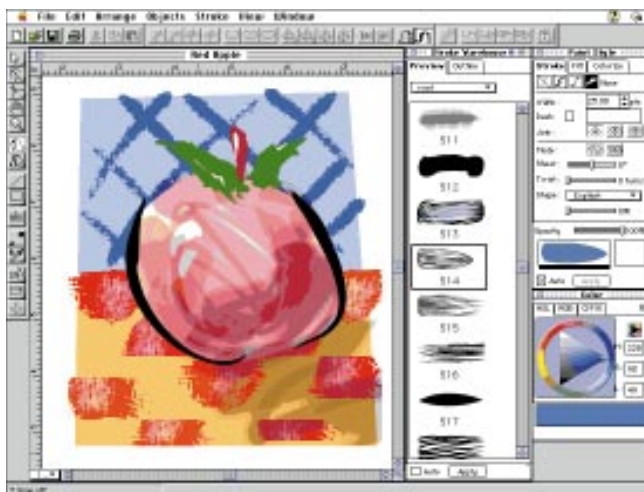
Fractal Design is claiming a first with its new Expression package which combines the best of bitmap and vector techniques.

But, ominously for the Mac, the Win95 version will appear first. Expression, the first launch for Fractal since its merger with Ray Dream, is based on software from Hong Kong-based Creature House

Bitmap graphics from packages like Adobe Photoshop offer stunning realism but huge file sizes, and cannot be enlarged without "jaggies". Vector images created in FreeHand or Illustrator reproduce smoothly at any size but lack a "painterly" feel.

Expression uses Skeletal Stroke technology which combines multiple vectors to create the effect of a single, painterly stroke., and includes a library of 150 realistic strokes.

Strokes are divided into Natural Media, Graphic Elements, and Multi-view Objects. Multi-view strokes contain several different views of



the same object, which allows the creation of simple, smooth animations. Images from Illustrator or FreeHand can be imported and saved as new Strokes.

Fractal said that its next release will benefit Mac users first. "We don't want to treat either camp as second class citizens," said president Eric Hautemont. But there are signs that the Mac is beginning to lose even its most loyal following. In an

extended interview with PCW next month, Hautemont revealed that former Mac-based designers were starting to move to Windows NT and Pentium Pro-based PCs.

Expression will be released in the early autumn for a suggested £299. The Mac version is expected a month later.

PJ Fisher

Web www.fractal.com;

Computers Unlimited 0181 200 8282

Top 10 Peripherals				Top 20 Windows			
Product	Manufacturer	Last month	Product	Manufacturer	Last month		
1 Quadspeed CD-ROM Drive	Vertos	-	1 MS Windows to Windows 95 U/G	Microsoft	1		
2 Epson Stylus Colour II Printer	Epsom	1	2 WordPerfect Suite for Windows 3.1	Corel	10		
3 US Robotics Sportster 28.8 Ext	US Robotics	2	3 Encarta 96	Microsoft	2		
4 Logitech Mouseman 96	Logitech	-	4 First Aid for Windows 95	RMG	9		
5 Umax Vista 56D Scanner	Umax	8	5 Hurricane RAM Doubler	RMG	7		
6 Epson Stylus Colour IIs Printer	Epsom	4	6 Uninstaller 3.5	RMG	5		
7 Philips TV Tuner Card	Philips	-	7 WordPerfect Suite for Win95 U/G	Corel	-		
8 Philips 16-bit MPEG Card	Philips	-	8 TurboCAD 2D/3D	IMSI	4		
9 Philips TV Crd + MPEG/BMP captr.	Philips	-	9 MS Publisher v.3,0	Microsoft	-		
10 MS PS2/serial Combo Mouse	Microsoft	-	10 MS Office 4.2 U/G	Microsoft	8		
Top 10 DOS				11 Dr Solomons Anti Virus Qrtly '95	S&S Intl	12	
1 MS DOS v6.22 U/G	Microsoft	2	12 PC-Cillin 95	RMG	-		
2 Flight Simulator v5.1	Microsoft	1	13 Masterclips Prem Collection 35,000	IMSI	14		
3 Duke Nukem 3D	US Gold	3	14 QEMM 8	Quarterdeck	17		
4 MS Flight Sim. New York/Paris	Microsoft	-	15 MS AutoRoute Exp UK & IRE	Microsoft	11		
5 DOS to Windows 95 U/G	Microsoft	9	16 Dr Sol's AV Qrtly for Windows 3.x	S&S Intl	18		
6 WordStar v.6.0	Softkey	-	17 MS Office 95 U/G	Microsoft	-		
7 PFS: 1st Choice	Softkey	-	18 MS Plus for Windows 95	Microsoft	16		
8 Turbo C++ v.3.0	Borland	6	19 MS Office for Windows 95	Microsoft	-		
9 PC Anywhere v.5.0 Host	Symantec	-	20 MS Office Pro for Win95 U/G	Microsoft	6		
10 Pegasus Solo Accounts	Pegasus	-					

Figures supplied by Software Warehouse and relate to bestsellers for June 1996.

An open and shut case

Tim Bajarin wonders whether Netscape might become the Windows of the open-platform web.



IF YOU HAD ASKED Microsoft executives last summer about their Internet strategy, you would have got mixed messages. But Bill Gates had a high-level team working on the answer and in February, when I visited his HQ, he said firmly that his strategy was to "embrace and extend" the Internet and eventually integrate his Explorer browser into the Windows interface.

These aims are well under way (see feature, page 114). But Gates's argument that his approach to the Internet and Windows is an open one would be contested by Marc Andreessen (pictured below), the technical guru and co-founder of Netscape. I recently spent some time with him and other Netscape officials to hear their plans for the Internet.

Marc Andreessen is a real visionary who reminds me a lot of Bill Gates when he was 24. Both understand the technology inside and out. Both have clear visions of what they want and of what it takes to invent the future. Both have a staggering grasp of the technical issues.

That is why Andreessen has been called the next Bill Gates. But, while Gates says his approach to the Internet is open, Andreessen's really is. Here lies the real titanic battle for the future of digital access.

Microsoft has had to depend on a one-chip platform, albeit open in Gates's definition of the word. Netscape relies on the

processor-independent standards of the Internet itself.

Microsoft contends that Windows is a real operating system with a robust application development platform, and that Netscape is just a browser for getting Web information. That may be true today, but with Java and other Web application development tools and plug-ins on the horizon, Netscape's browser is clearly being linked to technology that makes the Net an actual OS environment.

Andreessen told me with a sly smile that he has a "reverse embrace and extend" strategy. A Netscape release early next year will include features that can shrink and expand a window, and have multiple Windows on the same screen running multiple Web pages or applets simultaneously.



Web wonder: Marc Andreessen

That sounds like he is on track to create a Web graphical interface that matches Windows, yet is available for any digital device that can access the Web. This is really where the battle lines are being drawn between Microsoft and Netscape.

As Intranets become more critical to corporations, and Web-based applications begin to serve the needs of companies of all sizes, the pendulum could swing heavily in Netscape's favour.

This is especially true if Netscape can create rich development tools within its browser and "OS" environment so that any application can really work on any access device, no matter whether it is a PC, PDA, set-top box, PC/TV hybrid, or whatever.

Of course, never count out Bill Gates and Microsoft when it comes to a good fight or challenge. Microsoft's own Back Office strategy is moving towards Intranet hooks with Windows NC. Windows NC can work with chips other than Intel and could compete with Netscape for corporate Intranet users.

Gates and Andreessen are feisty competitors, with great respect for each other. I even think Gates sees a little of himself in Andreessen, which alone probably creates an affinity.

But make no mistake. Both want control of the Internet and want to become the dominant software provider. Each will do everything to win as we move towards a market in which open platforms become critical in delivering digital information, edutainment and entertainment.

AS MICROSOFT PREPARES to roll out the latest version of Windows NT 4.0, the story goes that this is the nineties operating system we have been waiting for. In reality there are two stories — one for Windows NT 4.0 Workstation and another for Windows NT 4.0 Server. But the bottom line is that Windows NT 4.0 is the sales opportunity the industry is waiting for. No-one more so than Intel, which wants to sell more CPU cycles.

The Pentium is pretty much at the peak of its performance curve, the clone vendors are moving in to mop up as they did with the 486, and Intel's Pentium list price doesn't leave much margin for people who put PCs together. Intel needs a 32-bit operating system such as Windows NT to exploit the Pentium Pro, its integrated four-way multiprocessor support and its forthcoming multimedia capabilities. Either version of Windows NT will do, so long as it's running on an Intel processor.

Further down the feed chain there's a split as some suppliers focus on Windows NT 4.0 Workstation, the reliable and secure workstation application platform, while others look to the Windows NT 4.0 Server platform as their vehicle for added-value services.

This is the crucial point because, more than ever, shipping boxes is a cut-throat business. Fewer and fewer manufacturers ship anything but Intel motherboards bearing Intel CPUs in Intel-sourced system boxes. Most will be hoping to squeeze out some extra margin and Windows NT offers a number of opportunities.

With Windows NT Server the added value is fairly easy to assemble. Servers are still valued property. Buyers want lots of support for which they expect to pay, and there's still room in a server box for

What the Windows world is waiting for is a real desktop operating system. It isn't Win95, says Terence Green; could it be NT 4.0 Workstation?

innovation and enhancement. Furthermore, Microsoft has laid the groundwork for systems integrators with the BackOffice line of server applications.

As a result, Windows NT Server sales have started to move after a slow build-up since its introduction in 1993. On 18 June Reuters reported Microsoft's Steve Ballmer, senior vice-president, sales and marketing, as saying that 108,000 units of Windows NT Server had been sold in the previous quarter, equating to a year-on-year growth of 70 percent. That puts Windows NT Server just a little behind Novell NetWare 4.1, and clearly set to eclipse it in the near future given Novell's inability to speed up the conversion of NetWare 3.xx customers to NetWare 4.1.

Yet, even at its rapidly accelerating take-up rate, Windows NT 4.0 Server won't soak up nearly enough Pentium Pro CPUs to please Intel. The star turn that everyone is looking to is Windows NT 4.0 Workstation. If it takes off, the market which has been somewhat subdued since the damp squib of Windows 95 will breathe a sigh of relief.

On the face of it, Windows NT 4.0 Workstation is ready for primetime, but there are a few "gotchas" which mean it isn't a direct replacement for Windows 95. It needs more memory and disk space than Win95, but these represent a fraction of the real added cost of Windows NT Workstation, which is in rolling it out and maintaining it.

Windows NT 4.0 doesn't pre-load easily or facilitate the

4.0 your pleasure

pre-loading of bundled applications. Nor does it support power management or plug and play, so mobile workers and users with energy-efficient systems have to forego power savings. Windows NT 4.0 is also less compatible with existing DOS and 16-bit Windows applications. The advent of Windows 95 has increased the number of 32-bit Windows applications, but they tend to be utilities and add-ons rather than core products.

What this means is that the people who will really benefit from Windows NT 4.0 Workstation are going to be those who have the knowledge to roll it out in quantity and to manage and maintain it. In 1996, and well into 1997, systems integrators and manufacturers with excellent system management and support capabilities are poised to cash in on Windows NT 4.0 Workstation.

Only in the next release, Windows NT 5.0 Workstation, in which the aforementioned problems will be fixed, will Microsoft deliver the operating system that desktop users are waiting for. ➔



The year so far...

PC sales were expected to grow by 20% or more this year. But now both Dataquest and IDC predict a growth of 10% or less on the grounds that most homes that could afford a PC already have one. So PC executives are trying to add power and features to attract upgrade sales.

Early 1996 was not kind to Apple, which reported losses of \$750 million, lost market share, and suffered 2,800 layoffs. New CEO Gil Amelio says Apple won't be profitable for at least 18 months.

Packard Bell became the number one PC vendor in the US, with a 13% market share, by acquiring NEC's US and European operations after merging with Zenith Data Systems' PC division. But its 7.9% world market share is still second to Compaq's 8.3%; Apple is third with 7.2% and IBM is fourth with 6.6%, according to Computer Intelligence.

PC demand could pick up. Retailers ordering for the Christmas buying season suggest a home PC sales rise of 15% on last year.

It's tough at the top

Cyrix is doing a good job of keeping Intel on its toes. So why is it having such a hard time? Clive Akass finds out.

THE RELENTLESSLY UPBEAT news emerging from Intel's smooth PR machine has not disguised a certain defensive tone. There is no serious threat to Intel as the dominant processor manufacturer but the PC industry no longer dances exclusively to its tune, and there are causes for chairman Andy Grove to remember his famous watchword: "Only the paranoid survive."

One is the growing importance of Windows NT, which runs on several non-Intel platforms. Then there is the World Wide Web, which has all manner of machines working together. Moreover, the fashion for hardware-neutral Java-based software looks as if it could turn into a trend, so the Intel-independent network computer cannot be laughed away.

Finally, ignominiously, Intel has been beaten at its own game. Cheap 6x86 chips from rival Cyrix have consistently beaten equivalent Intel Pentiums in tests based on

real-world applications.

Yet it is Cyrix that is having a hard time. Its total revenues are less than Intel spends on marketing, and it has been hit by a general slump in the chip market following disappointing sales last

Christmas. When I met Cyrix's European general manager, Brendan Sherry, at the Networks Show, the company had just predicted a \$15 million loss for the three months up to 30 June.

Nevertheless, Sherry cheerfully predicted an upturn, and put some of the loss down to the hiring of 100 extra engineers to work on new designs. These include the M2, Cyrix's sixth-generation processor which will support Intel's MMX extensions to boost multimedia performance by up to 300 percent. The M2 will sample in October and ship early next year; the first Intel MMX chips are due late this year.

The M3 will follow in 1997 and will be pitched against Intel's next-generation P7. Sherry said the design goal was to make the M2 twice as fast as the 6x86, and the M3 seven times. Both designs would be faster than their Intel rivals, Sherry said. "They [Intel] are caught with an architectural base that is very difficult to extend. One of the advantages of starting with the 6x86 is that we are coming in at a different level, so we don't need to make the same compromises."

He believed Intel had three P7 projects, one of which it is developing with Hewlett-Packard using VLIW [Very Long Instruction Word] architecture. Sherry said H-P might put this out as a bridge between its Precision Architecture and the x86 world, but "no-one at Cyrix believes that that will be Intel's mainline processor. If it is, then Cyrix wins, because they won't get anything like the performance

we've got. No way."

He predicted: "I think they will go to market with a pure x86 engine because that's the only way you get performance."

The "great news" for users was that all Cyrix chips would fit in the same standard Pentium socket, in contrast to the Pentium, Pentium Pro and Klanmath [see Newsprint], which each have different boards. This means that people wishing to upgrade did not need to wait for an MMX chip. "You can buy a 6x86 board now and buy an M2 when it becomes available. It will slot into the same socket."

Sherry sees no threat from the network computer, which he believes will be a niche machine; he dismissed Sun's Java as an over-hyped emulator that could never run as fast as compiled software. I suggested that this would be insignificant if chip speeds grew as fast as he predicted.

"Everything else will move on too," he said. "The extra power will be used up."

More telling was his assertion that PC prices would fall to NC levels. Cyrix has developed a Gx86 processor with signal-processing functions which do away with the need for multimedia add-on boards.

This could lead to a PC costing \$800, complete with a hard disk — not far from the \$500 target set by Oracle chief Larry Ellison for a diskless NC. "I am not sure what planet Ellison and [Sun chief Scott] McNealy are on, other than that they are on a planet that hates Microsoft and wants to kill [Bill Gates]."

Even Sherry does not expect to shake Intel, but just a small increase in market share would make Cyrix rich. Curiously, that would be no bad thing for Intel. It needs, and to an extent tolerates, the likes of Cyrix to stave off accusations of monopoly; and users need Cyrix at the very least to keep Intel on its toes. ■

CYRIX



In tests, the Cyrix 6x86 chip has consistently had the edge over Intel Pentiums

Computations

Poll performance

British computer (EDP) exports totalling \$12bn look pretty hot compared with the Franco-German axis: a mere \$5.8bn for France and \$8bn for Germany. Combined, the Euro-welfare states barely scrape past the British figure. On a per-capita basis, it looks good, too: at \$211 per person, the UK's figure is more than double that of France or Germany. But, oh dear: that poll division identifies the real competition like the Netherlands at \$574, and Ireland at \$1,557.

● Source: *Yearbook of World Electronics 1996*



BY ROWLAND MORGAN



Nice frame, shame about the window

Direct sales of custom-made machines has been a sweet business for Dell up until its price-slashing launch into the server market. The figures make the tinkling sound of a golden cash register: over \$5bn turnover, \$680,000 per employee; over \$1bn gross margin; nearly \$600m in the bank; and makes Michael Dell, 32, one of America's richest men. The juiciest figure is the smallest: because the company only starts on a machine the day it's ordered, Dell has, on average, a maximum 19 days' inventory stacked at the plant. The strangest thing, though, is how come if those direct-sale costs and prices are being cut so close to the bone, the margin on sales is nearly 20 percent? Oh, and just to give those

tinkling figures a modern touch, there's a clanging note being sounded by the customers: roughly one call in five to technical support at Dell's Bray, Ireland, telecoms plant comes from customers groaning about Windows 95. If Dell is getting 250 to 350 Win95 squeals a day, imagine how much pain is being communicated to Microsoft.

● Source: Dell Computer Corporation

Dear digits

Electronics is predicted to form ten percent of global GDP by 2005 but it will be an expensive process. Foreign firms, investing in UK production of electronics components, telecoms kit and electronic consumer goods at a rate of about £2m a day have created about 14 employees a day at a cost of some £138,000 per proper job.

● DTI/Invest in Britain Bureau

Titanic management

During the six-year period when fears of global-warming and climate wreckage were being confirmed, the Government-adjusted level of support for new and renewable energy technologies fell by nearly one-third, from £20.8m in 1990-91 to £17.8m in 1995-96. In the same period, the government spent, on average, over 18 times more money researching construction and property development than on environmental technology (£5,100 compared to £95,000). The enviro-tech spend fell by 40 percent, while research on construction and property development increased by 75 percent.

● Source: Hansard vol. 275, no. 83

Workers worth £9,500 a stone

Foreign computer makers have invested in UK production at a rate of about £1m a week, creating about 1.5 employees a day at a cost of some £95,000 per position, not counting casuals. Projects in Glasgow and elsewhere have shown that a community-serving job can be created for £4,500, or less than one-twentieth of the cost.

● Source: Invest in Britain Bureau/University of Strathclyde (based on 912 sample jobs)

Lottery lotsamoney

As advertised, the National Lottery has a computer network bigger than that of the four main High Street banks put together, with specialised software that took 300 man-years to develop. But let's not forget that the lottery machinery fleeces punters four times more ruthlessly than a bookie on his very best day.

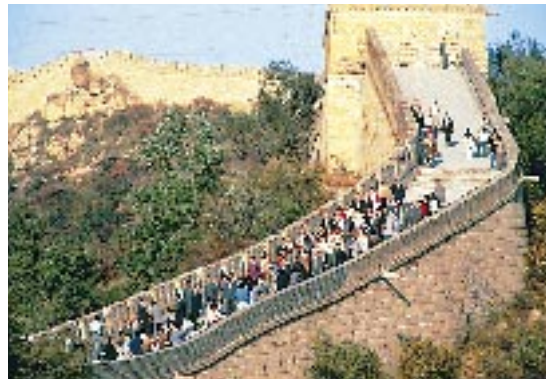
Approximate percentage excess of takings over pay-outs:

- By the National Lottery: 400
- By bookmakers in the high-earning 1995 Britannia Stakes at Royal Ascot: 56.7
- Source: Camelot plc/BBC Radio 5 Live. *Sports Yearbook 1996*

Not so tigerish

There are 15 metres of paved two-lane road for each car in the current Chinese fleet of 400,000, leaving little room for lorry transport. China aimed to have about 70,000km of rail track by last year, less than twice Britain's for a country 39 times bigger. But the great Asian tiger boom in computers is still a few years off, with some 36 computer factories in operation, compared with 1,621 in Britain. And although software sales last year were put at about US\$1.2bn, foreign OS's and applications have to rewrite almost from scratch because of the 2,000 ideograms of the Chinese language and the Chinese multiplicative system of numbers.

● Sources: ONS PRODCOM/Euromonitor, Consumer China 1996



Sounding Off

My VCR, a Panasonic NB JV-35, has been functioning faultlessly since 1989. My midi-system, a Sony LBT-V102, has been giving

the neighbours a daily 40W-worth of Noel Coward and Rogers & Hammerstein since around July, 1990. My PC, however, an unbadged 486 DX tower unit, joined the angels last Saturday while still in the bloom of its youth. It can't have been more than 15 months old. Just old enough to be outside its guarantee period. Typical.

This month's column was supposed to have been about communicating data using a laptop connected via a GSM digital phone. But unfortunately, the two thirds of it that had already been written died along with the computer's hard disk, so you'll have to wait for the dubious pleasure of reading that. So instead, I am lamenting — no, complaining vehemently about — the fact that PCs are, without doubt, the most unreliable pieces of consumer electronics equipment since the original Baird mechanical television receivers. I should know: I've been through three of the damn things in as many years and I know I'm not an exception.

When you think about it, a whole industry (Colorado tape streamers, Exabyte tapes, Iomega Zip drives and so on) predicated its very existence on the proposition that your PC isn't just likely to go wrong, it definitely will. It's not a question of if, but when. So the message is: cough up 500 quid for a decent backup unit or suffer the consequences. If parachute manufacturers marketed themselves in the same way, all the world's airlines would go bust overnight.

So what makes a PC so inherently spavined compared with, say, my Hotpoint fridge-freezer (which, incidentally, cost about £500 less than the computer)? Both have precision-engineered moving parts. Both are used on a daily basis. Both are now essential rather than luxury items. Yet no-one is making any money out of selling us backup fridges. Nor is there any emergency service you can turn to if your fish fingers start to spontaneously defrost.

This is because no-one needs a backup



MICHAEL HEWITT

fridge: the manufacturers have got it right from the outset by putting the emphasis on inbuilt reliability. They've had to. They know that normal people simply would not accept the frequency of downtime that PC owners routinely put up with. What is it they reckon... a likelihood of at least one hard disk crash every two years? Absolutely ridiculous. Try selling any other household gadget that performs like that and see how long it takes before the team from "Watchdog" is doorstepping you.

My theory, for what it's worth, is that while the majority of white and brown goods are manufactured by people who actually care what they're doing, most PCs are chucked together by pimply, GCSE-less morons who would normally be lucky to get a job walking Oxford Street trying to flog imitation Rolex watches. When you ring up these computer mail order companies, half the people on the other end of the line sound as if they're at least two or three IQ points below plankton. The other half don't sound quite that intelligent.

Yet they can still get away with selling garbage. Why? Because, historically, computer users have been second only to bluebottles in their willingness to lap up any old crap that's going. How else do you explain the Sinclair QL, the IBM PS/1, all laptops manufactured before 1994 (and a good few thereafter), the Apple Newton, dBase IV, WordPerfect 6.00, the internet, books about the internet, and my sodding PC?

It's ridiculous how dependent 20th Century Man has become on these over-priced pieces of Taiwanese tat. Twenty years ago, you never heard of a company being brought to a standstill by a typewriter crash (unless it landed on the MD's head) or a corrupt piece of foolscap. Today, however, it only needs a cup of coffee spilt in the wrong place, or a little power spike, to trigger the entire nuclear arsenals of both super-powers. Then again, the missiles are computer-controlled, too, so I don't suppose there's much risk of them getting very far.

With the benefit of hindsight, what I should have done, of course, was to rent my main computer. Okay, it would have set me back £35 or so a month, but seeing as I'm Schedule D that would have been tax deductible, anyway. And then, when the thing inevitably went West, I'd have just rung up the company that supplied it and told them to replace it with one that worked properly... or else — just as in the days when everyone rented their televisions and videos. They didn't rent them because they couldn't afford to buy them. They rented because, at the time, televisions and VCRs were comparatively unreliable and were always out of date after three months. Rather like today's PCs, really.

Fortunately, I have a couple of functioning laptops about the place so I can still work. Unfortunately I hadn't, of course, been making any backups from the PC, so its data has disappeared for good. (If I had been backing up, I imagine the thing wouldn't have gone wrong in the first place.) But in a remarkably late stable door-bolting exercise, I've now been down to PC World and bought an Iomega Zip drive and half a dozen 100Mb disks. Oh, if only I'd done it a couple of weeks ago...



Homefront

Wherever a crowd of computer experts are gathered, be it the real electronic world of on-line conferencing or the hazy virtual reality of

the Dog and Duck, the conversation will turn relentlessly to nostalgia. The usual opening gambit will concern magnetic tape or punched cards, and various horror stories about breaking the former or dropping boxes of the latter will be used as warming-up anecdotes.

"Fortunately, we managed to patch things up with an old pianola roll and some Sellotape. Otherwise, the entire National Grid would have ground to a halt." From then on it gets worse. Beware especially of anyone who refers to a computer as "she" or "he", rather than "it". This is a sure-fire danger sign that the speaker is about to launch into a long story, of which you will understand little and care less. The audience will be composed mainly of men with beer froth on their beards, nodding sagely but with that intensely irritating little smile that means that they can outdo the current speaker with an even older, longer and more tedious story.

Apart from retreat, there are several defences. The thing not to do is to start taking the mickey. This is playing into their hands. These guys are all old enough to remember Monty Python from the first time around and will launch into their own version of the Yorkshiremen sketch.

"Reels of magnetic tape? We used to dream of tape! We had to make our own poonched cards wi' cornflake packets and our Gran's old knitting needles!"

"Poonched cards? We used to dream of poonched cards! We had to stick beads on abacus wi' flour and water paste and send lad off on bicycle t' university, 40 miles away. Results came back in binary, two months later."

"Abacus? We used to dream of having an abacus! It took two thousand of oos programmers to drag sarsen stones from



T I M N O T T

"Beware especially of anyone who refers to a computer as she or he, rather than it"

South Wales to Salisbury plain. And then we had to wait till solstice to run t' program." And so on, until the conversation takes a great and fatal leap sideways to the dead parrot sketch.

"This piece of assembler code is dead. It is deceased. It has ceased to be..." Of course, if you can come up with something outlandish but absolutely true, you can stop the conversation stone dead as no-one will be able to top it. As did the man in one such nostalgia-fest on CIX who claimed to have turned the handle on Babbage's second difference engine for a living. This happened

to be true. He was the curator of computing at the Science Museum and twice daily gave a demonstration of the 1992 replica. After that revelation, all the other gurus went strangely quiet.

The other way to stem the flow of this digital diarrhoea (*thank you, O Spelling Checker*) is to innocently ask for advice. You may have heard of Parkinson's law: within an organisation people will continue to be promoted until they reach their level of incompetence and there they stay. The outcome is that most key positions in companies are held by those who don't really know what they are doing. I have my own theory, which is that computer expertise follows a similar pattern: careers flourish until the individual's brain is full and then they stop. Probably in a key position within Unisys or IBM.

Ask, politely, how you can configure a Windows 95 PC to play Doom or how to persuade it to print graphics on the correct page, and they won't have a clue. Pressed further, you'll find that the real fundamentalists have an inherent distrust of personal computers, and even the younger members will have their brains so full of WordPerfect 5 keyboard shortcuts and XTree commands that the advances of the last five years will have passed them by. In other words, these "experts" will know less about your problem than you do and hastily change the subject to the quality of the Theakston's ale this evening. Nevertheless, they will still try to make out that everything is a lot simpler than it was in the days of "real" computing. As we all know, this is not the case. If it were, then we wouldn't need 60-odd pages of *Hands On* advice in every issue of *PCW*.

Things aren't getting simpler; they're getting even more complex and all our brains are filling up. I look forward to the day when I, too, can stop learning and bore for England on how we used to edit t' registry by hand and had to click on buttons to make anything happen. Ee, lad, that's when 32 bits was 32 bits. Of course, it were all fields round here then. Another pint of Theakston's? Don't mind if I do. ■

Straight talking

Just because something is free, does it have to be a half-baked mess that is near impossible to use?

No; and it's counter-productive. There is one very good reason why a computer company gives software away free: it is to try and create a de facto standard. So when Superscape sticks a Beta version of Viscap on the Net and encourages people to download it at no cost, the motive is to create a critical mass of satisfied users. Even people (like me) who normally refuse to play free guinea pig with Beta software, are tempted to give it a go. This is because Superscape has tied up with Intel, who had tied up with English Heritage, to put a Virtual Reality model of Stonehenge on the net.

But if the "millions of people round the world" whom English Heritage chairman Sir Jocelyn Stevens wants to roam the virtual stones suffer anything like the problems I encountered, Superscape would have done a lot better to wait a while.

English Heritage looks after old monuments and for thirty years has kept the public out of Stonehenge. People try to carve their names, or chip off bits of the old blocks to take home. "To walk virtually is better than not to walk at all", says Sir JS. "Anyone, anywhere in the world, whether in Britain or Australia, will be able to walk through the stones this way."

The first part of the Planetarium demonstration was sourced from an Intergraph workstation, which uses two 200MHz Pentium Pro processors in parallel, with 128 megabytes of RAM running under Windows NT. At a cost of at least £20,000, this is hardly your average home system.

We then saw an EH archeologist browse through the Stonehenge web site, on what was later said to be a more typical PC. But no-one bothered to tell the audience that the browse was coming off-disc, not off-line.

"What will it look like when it comes down a telephone line?" I asked. "Cynical journalist," grumbled Intel's vice-president, Steve Poole.



B A R R Y F O X

There was no on-line system working. But to his credit, Intel's European technology manager, Ian Wilson, went off to his nearby hotel, picked up his HP P120 OmniBook and hunted round the Planetarium for a telephone socket that bypassed the non-standard switchboard. With a 28.8Kb modem, the results were terrific.

The Stonehenge site (at www.intel.com) sends over an 800Kb file (compressed to 240Kb) which creates, in the PC, a VR model of the stones. The Viscap viewer works on the model in real time, off line, while using the line connection only for commands, links and text. VR motion is smooth, irrespective of connection speed. There is a bar graph control which lets the user adjust the display resolution to suit the processor speed. The higher the speed, the better the resolution.

Because it all worked so well, and so smoothly, I thought I would give it a try that night. But of course, I had only seen the system working on a PC set up by the people who designed the system. More than a week later, I still haven't roamed the

stones. And the only person inside English Heritage who can claim actually to have got it working himself, is the chap in charge of the giant government organisation's IT and network operations. Even he admits it is difficult.

If you too are tempted by the puff reports written by journalists who simply saw the Planetarium demo off-disc, here are a few hints to ease the pain. There is no single source of helpful help. I got most of this information through talking with helpful people at Superscape and EH's IT.

Because Intel is using Stonehenge as a publicity pitch, the system only works on a Windows PC, not a Mac. You must have a Netscape browser — Mosaic and Microsoft Explorer will not do. An Explorer version is promised, but nothing for Mosaic because it won't support the Viscap concept. Netscape Navigator version 1.2 won't do; it has to be version 2 or later. And it has to be a 32-bit version, not 16-bit.

The Viscap Viewer must be downloaded from the Intel site. Its 1850Kb took me half an hour using an ISDN line. The on-screen instruction tells you then to run the file "runme.exe". But there is no such file. It's "runme106.exe". This should self-expand to "plug in" to Netscape. After a lot of "cannot find file" and "access violation" false starts, Viscap finally plugged itself into Netscape and ran an animated logo.

But although Netscape on its own quite happily winsocked to browse the web, Viscap-plus-Netscape stubbornly refused to lock into the connection. Un-install, re-install, download again, try again, the helpers advised. But all to no avail. After very many hours wasted, and unless someone clever comes up with a simple solution, I've now lost interest.

So far, all Intel and Superscape have succeeded in proving is that the broad concept of downloading a VR model can work very well. The field is still wide open for any software company that can sell a system that does this without obliging users to play circus animal and jump through hoops.

● For a different view of Intel's virtual Stonehenge, see *Cutting Edge Focus*, page 197.

Business matters

It's rare that business overlooks a win-win opportunity, but teleworking, the use of information technology to enable staff to work from home or small local

offices, has proved to be better in theory than in practice. In the first place, there's something paradoxical about teleworking. In the early seventies, when computing was just putting aside its Big Brother image, it was assumed that time-sharing minicomputers, centralised machines with remote terminals, would be the basis for information communities. Instead it was the PC, designed originally as a totally isolated device, that proved to have the flexibility to make remote working possible.

Even now, when the technology to move workers away from the office is no longer leading edge, teleworking is still rarely used. It's not that it is unattractive. Think of missing out on that regular journey to work and instead working in your own surroundings, dressed however you prefer. If you like music while you work or to sit there in the nude, then why not?

Teleworking is good news for employers, too. Office space, especially in areas such as London, is ludicrously expensive. Teleworking can drastically reduce the amount of office space required, while simultaneously improving productivity, increasing staff morale and even gaining environmental brownie points by reducing unnecessary car journeys and pollution.

So why the lack of enthusiasm? There is some resistance from the unions: they're understandably worried about people being forced to work from home; not everyone's home environment is suited to working. To be effective, teleworking needs to be voluntary, or with the option of using the atrociously-named "telecottages"; small local offices with low overheads. But far more resistance comes from employers. Ask them why they don't use teleworking and they will generally come up with excuses and



B R I A N C L E G G

arguments that appear to make sense until you test them out. Most popular is probably the lack of real cost saving. Even if a hundred people started to work from home, no doubt they'd be scattered throughout a fair number of departments. There would be pockets of empty office space here and there, making it unlikely that the company would be able to sell off a whole building, so there would be little real reduction in cost. Yet when the opportunity does arise, it still isn't grasped. Right now, large companies are busy building expensive new offices in and around London — an ideal opportunity to cut down on office-based staff yet one that's hardly ever taken. Even without a new building on the way, it's really only a problem of logistics rather than practicality.

Their second line of defence is job suitability. How, they argue, could you have

supermarket checkout staff or airline pilots working from home? This is entirely legitimate (admittedly, these particular jobs probably could use teleworking but the customers wouldn't like it much). However, no-one suggests that the whole world takes this approach, and for a substantial number of jobs it is ideal. It's not just for solitary knowledge-workers either. Many managers, for example, spend much of their time in their office at the PC, on the phone, or in meetings. Teleworking could provide for the first two activities and additionally ensure that less time is wasted generating hot air at meetings because, for a teleworker, meetings require strong justification.

Once this argument is out of the way, only technicalities remain: how to connect into the email system and how to maintain PCs in the home — nothing that can't be fixed. Yet still it doesn't happen. In the end there's one more obstacle, generally unspoken but actually the biggest of them all. It's called trust. Just as many employers don't really trust their staff with a PC (the strongest attraction of Oracle's diskless Network Computer is regaining central control); they feel equally threatened by employees who are out of sight.

A new picture is needed of what work is all about. Too many businesses are still tied into the time clock that arrived with the industrial revolution. Endless, potentially productive hours are wasted: recording time, reporting on time, feeding time into project management systems. What teleworking requires is a more product-orientated view. It's not time that matters, it's the value of the employees' output. Measuring this is not always easy, but it's a huge step forward from punching the time clock, and it brushes away the true problem with teleworking.

Speaking as someone who works from home for large companies, I'm inevitably biased. But as I sat in a stop-go queue on the M25 last week, it was hard to believe that many more people wouldn't like to reap the rewards of teleworking.

● You can contact the author at BrianClegg@msn.com ■

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Letters

No competition

I usually enter your competitions with little or no real expectation of winning a prize, but I feel that this month (August issue) my luck could change. After reading your review of the main prize I fully expect my entry to be the only one.

On the competition page, the Aptiva is referred to as "the much coveted 133MHz Pentium Aptiva", but in the review it is described as "an old, sick family animal that should be put down, and IBM's only chance to get rid of them is to give them away".

Some prize! Will there be a cash alternative so that I can buy a machine that doesn't get a firm thumbs down from your magazine?

John Hole
Enfield, Middlesex

PCW replies: We've received a number of letters pointing out this irony. It was even picked up by *Private Eye* (see this month's *ChipChat*).

Toshiba TF461 multi-function device

I believe the review of the Toshiba TF461 multi-function device (First Impressions, *PCW* July) was a little unfair. Toshiba has become a world leader, with a turnover of \$54 billion, by listening and responding to customer

needs. The company believes customers should not have to sacrifice colour printing to capitalise on the cost and space-saving benefits of multi-functionality.

The TF461 has a colour printing facility and is currently one of only two machines in its class to offer this — a fact we feel was not adequately covered in Simon Rockman's piece.

We would also like to highlight some of the other fax features of the TF461 which offer superior performance to the HP OfficeJet LX printer/fax and were not fully highlighted in the review. They include a larger memory allowing up to 165 A4 pages compared to 32 in the HP OfficeJet, and a 150-page paper tray compared with 100 on the HP.

We appreciate the comments regarding the additional charges for the fax modem and scanning software, and this is now included free of charge with the TF461. We have also upgraded the product manual to make it more user-friendly.

Keith Hanks
Product Manager
Toshiba Copier/Fax
Division

The physical world

"Cyberspace has developed a new brand of transcendentalism that denies

the physical with as much zeal as Christianity. And the consequences for our mental wellbeing can be disastrous." (Review of *War of the Worlds*, Books, *PCW* July, p248). What is that meant to mean? I am a Christian and live in the physical world. I don't deny it exists, in fact a major part of Christianity uses the physical world in the worship (the Lord's Supper).

I appreciate that this was only a metaphor, but could more care be given to such comparisons, especially when used in the negative sense?

Martin Brown
@cix.compulink.co.uk

Getting down to business

In Brian Clegg's Business Matters column (*PCW* August) he didn't seem to know whether to focus on the non-corporate users of various operating systems or "matters corporate". Somewhere between the two are thousands of people like me — sole traders supporting their businesses through one or two PCs. We are not nerds, we are not DOSsers and we are not diehard Windows 3.1 advocates.

A second problem Mr Clegg seems to have is regarding "business" computing as being about middle to large sized organisations. However, the vast majority have in fact 100 employees or less. It is the precise nature of the business which determines the need for processing speed and program complexity, not whether an OS is generally considered to be "the best".

Many of us use Windows 3.1 because it satisfactorily does the jobs we want it to do. I have a DX2-66 with software ranging from two years old to new. Recently I looked at Pentiums, and at fitting a respectable amount of RAM to my machine. The decision was simple, both from the standpoint of performance and cost — lots of RAM.

Perhaps surprisingly to Mr Clegg, there are lots of intelligent, sensible, experienced users out here who make informed decisions about their setups. In terms of primary demands they look at what is actually *necessary* to do the job, what they *wish* to afford in the way of hardware and software, what their middle term upgrade *needs* are likely to be, and what kind of *support* they are likely to get with new programs and hardware. Then they look at the *secondary demands* upon their setups and make their decisions.

The arrogance and monumental prejudice of Brian Clegg was not attractive to me as a reader. Nor were his simplistic typologies or his inappropriate generalisations about OS users' motivations. Apart from the last three paragraphs, the column wasn't entertaining, wasn't accurate and wasn't informative.

F Ashton
Clearwater Staff and
Manager Personal
Development
Lancashire

Seeing red over cover CDs

Every so often, when I have time or when I have upgraded my machine, I try some of the cover disks and free CDs that have piled up over the months. Invariably, I end up screaming at the machine to get on with it, or to shut up, while frantically searching for the volume control at the back of my system box, or for the exit button on the screen.

I have a 486 SX2-50 with 12Mb of RAM, a 2Mb S3 video card, a double-speed CD, and a 250Mb hard disk. It may not be state of the art, but it is a spec that must reflect thousands of machines. First, all these CDs seem to want to take over the computer, demanding that all other applications are closed and that the colour depth is changed to suit them, usually to 256. Then, I am told to

install the latest video driver, and sometimes have to, even though I have done it several times before. Everything takes an age to load, or to react to a mouse click. Usually, about half the stuff simply does not work at all, and I often have to Ctrl Alt Del to escape.

If televisions were offered to the public in this state, we would never have proceeded beyond radio. The most important thing, for me anyway, that a computer has to do is respond instantly to my input, even if just by showing a depressed button; and the second thing is to tell me what is going on and what I am waiting for.

I'd like to know whether my experiences are general, or whether it is just my machine that is at fault?

David Kelsey, Suffolk

PCW replies: Do take the time to try out this month's improved and redesigned cover CD. You will still have to close other applications before you run it, but performance should be fine on your machine.

Adams family values

I have just experienced the sort of service and dedication I thought had disappeared forever. My critical letter (*PCW* August, "All round the houses by the direct route") was valid at the time of writing. However, having met Mike Stuart of Adams' technical department, my view of this company has been completely revised.

Mr Stuart read my email after midnight on 29th April, replied to me at 8.30am the next morning and spent time on the phone explaining what had gone wrong as far as he could determine. He offered to make a personal visit to my house at around 7pm that night and arrived as promised with a six-speed CD-ROM and a Matrox graphics card which he duly installed. He also changed my defective hard drive, having first taken

the trouble to copy all my files to the new drive. What a star he is, and I hope Adams is able to keep him, as such staff are a rare commodity.

Peter Collins
100043.2176@
compuserve.com

PCW replies: Unfortunately, due to an administrative error Adams was not given a chance to respond to the letter published in our August issue. It's good to hear that the story had a happy ending.

Banking on it

I refer to the Online Shopping feature (PCW August) which covered home banking. The facts in the article are not entirely accurate.

It was, in fact, the Bank of Scotland which pioneered home banking with the introduction of personal HOBS (Home and Office Banking Service) and not The Royal Bank of Scotland as specified in your article. Additionally, HOBS was in fact launched in 1985 and not in 1988.

You may also be interested to know that HOBS users also enjoy a unique high interest Investment Account (currently paying up to 5.4% gross on balances of £100,000 and above), allowing them to gain valuable extra interest on their surplus funds.

Shona C Cumming
Press Officer
Bank of Scotland,
Edinburgh

Conspiracy theory

Why are current computers so wasteful and inefficient when it comes to storing text? With the wonders of sophisticated programming I can see the need for large program files, but it strikes me the PC world is crazy to accept disks full of data of this magnitude. Just to check, I typed "The cat sat on the mat" and saved it, in each of three formats. Results: WordPerfect 5.1; 611 bytes Microsoft Word 2; 1,799 bytes Microsoft Word 6; 6,656 bytes

No wonder I had to buy a new hard disk... Oh, *that's* why... Is this a conspiracy?

Ian Black
100450,3467@
compuserve.com

Plain sailing

I read the article "In Search of the definitive mobile" (News Analysis, PCW July) with interest. I have recently joined CompuServe specifically for the email service. I am a self-employed electrical engineer, currently working in the field of luxury yacht design. This, by nature, is a worldwide business. My present clients are in Turkey and equipment is purchased from Australia, USA, UK, etc.

My only portable is a Psion 3a. I pondered on the purchase of this for many months, considering also the products of Sharp and Hewlett-Packard. The final choice was made after reading many magazine reviews and was based on the software suite and battery life.

Our Psion user is all at sea without a bigger keyboard (see Plain sailing)



Although I like the software and the screen, the keyboard drives me to distraction! Why do people (reviewers) say that it is okay? If I want to use the Psion to write notes, I spend half the time going back over the text to insert those letters that did not "hit" when they were typed. Now I cannot be bothered to use it for serious note taking, preferring pen and paper instead.

So, my definitive mobile would be based on the Psion 3a with the same software suite, but with a decent keyboard. The keyboard would have to be big enough to touch-type on, with decent key contacts that don't keep missing letters. I'm not unhappy with the screen on the 3a, but a bigger keyboard would permit a larger screen. Of course, the mobile would have to have a built-in modem and standard PCMCIA card slots. Instead of the wire link, an infra-red link would be nice.

It looks like we are heading for a full-sized notebook. However, if the general layout could be like that of the Psion 3a, the machine should still be more compact than a notebook computer. Lastly, if the price could be kept to around the £500 mark, then I could consider buying one.

Eric Perryman
106027,102@
compuserve.com

Five go mad with £2,000: readers respond

I was delighted with the above article in July '96 and particularly Gordon Laing's ideas. As easy as Lego and in 1.5 hours? If so, can you recommend any publication which illustrates how to for a novice buff?
Ricky Gray
ricky@lenzie.demon.co.uk>

I do like your articles on buying PC products within a tight budget (July 1996). The only problem is that ordinary people like me (I suspect most of the population) are required to pay VAT on all goods we purchase. So really, your article should have been "Five go mad with £2,350", not quite such a realistic amount for the average man in the street! But interesting reading nonetheless, and to parody the BT advert: "It's nice to dream!"

Colin Dalziel
cdalziel@iee.org.uk

In the July issue of your magazine, once again you featured your traditional Five Go Mad... article. I see that this year, however, the budget has been raised to £2,000. This apparently minor change has destroyed the very essence of this article. The whole point of giving the writers a budget to stick to is that it restricts the amount of money that they have to spend. If this budget is raised too high, the attention that needs to be paid to it decreases.

For me, the essence of this article has always been that the writers have to prioritise what they want to buy. Save the pennies for memory and buy an inkjet printer, or splash out on an lomega Zip drive? It is the sole article in your magazine that addresses the fact that most buyers do not have infinite budgets, and cannot afford always to have the fastest processor and the latest gimmicks.

The increase in the budget does away with this. The writers were not saying that P75s are acceptable, fast processors (which they are), but given a lower budget they would be, just as they were buying DX4-100s last year. It is of less relevance to the reader what the writer's dream machine is, even if there is a notional

*...it's four out
of five, for
effort*



budget. What is useful is what the writer would buy, given an average budget for a new PC.

Andrew Smallshaw
ajs.a@mailgate.cardinalnewman.ac.uk

Thanks for a great article. I have already (and I only got time to read it this morning) recommended it to a couple of people who have been bugging me with the "okay, you're in computers, where do I get my Oric fixed?" type questions, chiefly because for the first time in a while (probably since the last article) you cover all of the basics, roughly equally.

I have two quibbles. One is to do with your summing up: because if you're really aiming at the SoHo market and are prepared to criticise Clive Akass for spending just £1,500 on the basics and the rest on luxuries, then I'd have said that the "rock solid guarantee" as part of PJ Fisher's system is (for that kind of user) worth more than you give credit for. I've spent too long digging small libraries and suchlike out of a mess, not to have gone for the same "single point of kicking with some serious chance of getting a result" approach for my replacement home stack last year. Unless you're actually being paid for working out why a system has started making frog noises when you try to log on to MSMail, life's too short...

My other quibble is with Gordon Laing's wine selection. If I were building a system, I'd opt for two bottles of Ernest and Julio Gallo's White Grenache (e.g. from Threshers) which at £3.50 per bottle would take the total to £2,001, the cost of Adele Dyer's system. I find that its lighter texture is more acceptable when trying to work out which device is already using address 340, while having a second bottle in reserve so that your spouse or partner can join you in a celebratory glass or two afterwards, is always a boon). But then, perhaps you didn't tell Gordon that the extra quid was a rounding error, or, maybe, he isn't married. As always, the opinions expressed are mine alone and do not necessarily

reflect those of any organisation with which I may be connected.

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Watford Electronics Ltd

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TFT NOTEBOOKS FROM £999 EX VAT & PENTIUM 100 PCS FROM £699 EX VAT - SEE PAGES 436-455

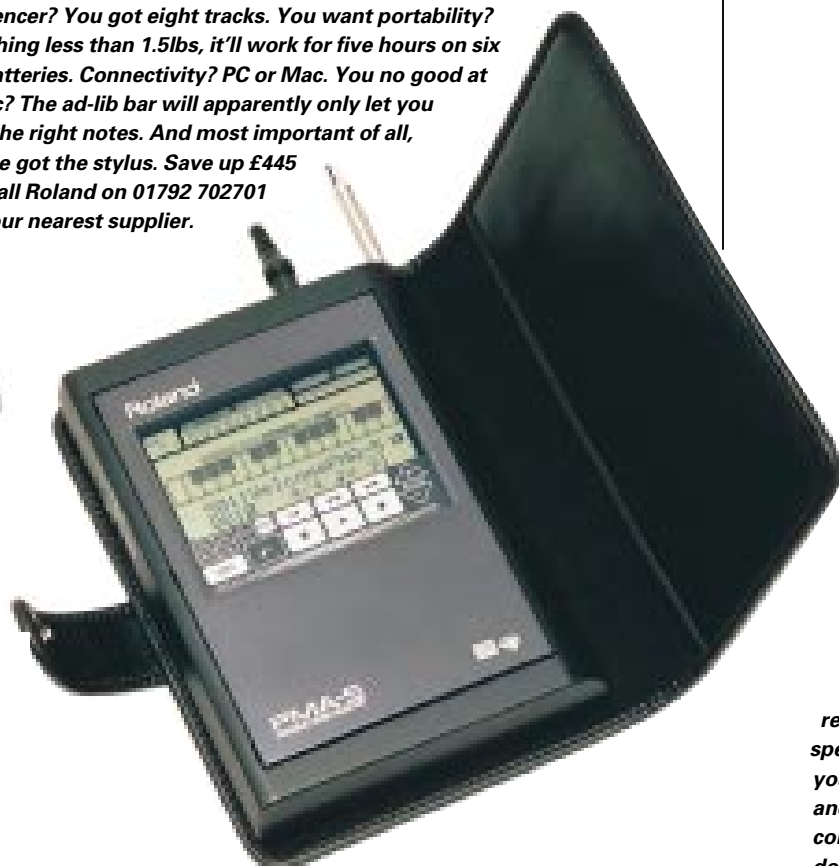
Palm Pilot 5000

The Palm Pilot is small enough to slip into your shirt pocket and yet powerful enough to recognise handwritten text using simplified Graffiti script. It comes complete with organiser software and a little docking station that plugs into a PC or Mac, and its party trick is to reconcile files on the linked machines at the touch of a button. Prices range from £279. For a full review, turn to First Impressions, page 64. Price Pilot 5000, £349 + VAT; Pilot 1000, £279 + VAT; memory upgrade, £129 + VAT. Contact US Robotics 01734 228200



Roland PMA-5

Rolf Harris step aside — this is a Stylofone for the nineties. Whether you're a gadget freak or an electronic music fanatic, Roland's PMA-5 is the must-have doobrie this month. You want great sound? Look no further than Roland's excellent General MIDI/GS samples. You want a sequencer? You got eight tracks. You want portability? Weighing less than 1.5lbs, it'll work for five hours on six AA batteries. Connectivity? PC or Mac. You no good at music? The ad-lib bar will apparently only let you play the right notes. And most important of all, you've got the stylus. Save up £445 and call Roland on 01792 702701 for your nearest supplier.



Sanyo VPC-G1

Not wanting to be left out, Sanyo is jumping on the digital camera bandwagon with its brand new VPC-G1. Also known as the Image PC, the camera offers a maximum 640 x 480 resolution. At this high resolution, up to 16 images may be stored in the standard 1Mb memory. A greater number of images may be stored using built-in JPEG compression or the lower 320 x 240 standard resolution. It also boasts a built-in flash, automatic operation and a 37mm lens thread which can accept certain video-camera lenses.



TC1500 Book Amp

Blow away your audience with these small but perfectly formed presentation speakers from Multimedia Labs. They are designed to be portable, but also to whack out an honest 12 Watts RMS per channel, with a frequency response of 50Hz to 18kHz. The woofers are side-firing, so the speakers can be put back to back and still give stereo sound if you have very little space. The amplifier box has separate base and treble controls, and can be operated from a dinky infra-red control which has switches for power on/off, volume up and down, and remote mute. Price £99.99 incl VAT. Contact Evesham Micros 01386 765500



This Atomic Computer Clock from Galleon Systems not only looks smarter than your average timepiece, it is smarter. It checks the time each hour against the MSF standard time signal transmitted from Rugby, and corrects your computer clock if necessary via a serial link. This is very useful if you need to time-

stamp a transaction or the sending of a document. If there is any argument about when the deed was done, you can point out that your timing is accurate to within a second in a million years, as measured by a caesium atomic clock. On the other hand, you'll never be able to lie about your clock being wrong when you are late for an appointment. Prices start at just £69 for a clock, serial cable and Windows/DOS drivers. A PC Card version is also available, as are drivers for Novell, NT DEC VMS and Unix systems. Contact Galleon 0121 608 4433

Atomic Computer Clock



Reveal Multimedia Keyboard KB 395

Speakers and the audio output is actually pretty good. Though not comparable with top-notch speakers, at £59 (incl. VAT) it's difficult to find a more comprehensive Windows 95 keyboard at such a budget price. Installation is very easy through several connectors, while the integrated audio subsystem of the keyboard is independently powered. Make sure you adjust your sound card control software for optimised audio output, though. With a 3-Watt stereo amplifier, built-in microphone, external headphone, microphone sockets and master volume control switch, Reveal's KB 395 seems to have everything built in, except a wrist rest. Contact Reveal 0181 845 7400



First Impressions

It's cool for companies with the low-priced Compaq DeskPro or the easily upgradable Digital Venturis desktop PC, while family matters are taken care of by the easy-to-use H-P Pavilion. For CD-R packages, look no further than the Plasmon CDR4240 — compared with others, there's no contest. And road runners, get your kicks with Route 66.



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VNU European Labs



VNU Labs tests cover every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The tests are continually developed and enhanced to reflect hardware and software developments.

Our tests closely simulate real-world use. For example, our suite of PC benchmarks uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom 2 frame rate test which is a good indication of games performance.

Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. The tests, which are mainly Windows-based, are used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

● To make them easy to read at a glance, all graphs in PCW are drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.



HARDWARE

Palm Pilot 5000

This pilot can't fly, but it can recognise your writing and store a lot of information

Machines relying on handwriting recognition have not been a great success. Apple's Newton palmtop was forced into niche applications involving undemanding form-filling, and other models like the Amstrad Penpad sank without trace.

The pen-driven Pilot organiser uses the same Graffiti recognition software and simplified alphabet that is available on the Newton and HP's OmniGo 100. Yet it has received rave reviews in the US. This may be because users no longer expect too much of handwriting recognition.

The Pilot comes from Graffiti developer, Palm Computing, now owned

by US Robotics, who designed it around its own software. It is very well-tailored as a mobile adjunct to a PC or a Mac.

The Pilot is about the size of deck of cards (4.7in x 3.2in x 0.7in), and most of the upper face is occupied by a monochrome LCD screen. It's not backlit, and can be difficult to read at times. The pay-off is that the power drain is so low that two AAA batteries last up to three months.

Along the lower edge of the screen are ranged a power switch and buttons for the main organiser applications: diary, address book, to-do list and memo pad. These buttons switch the machine on and between them sit forward and

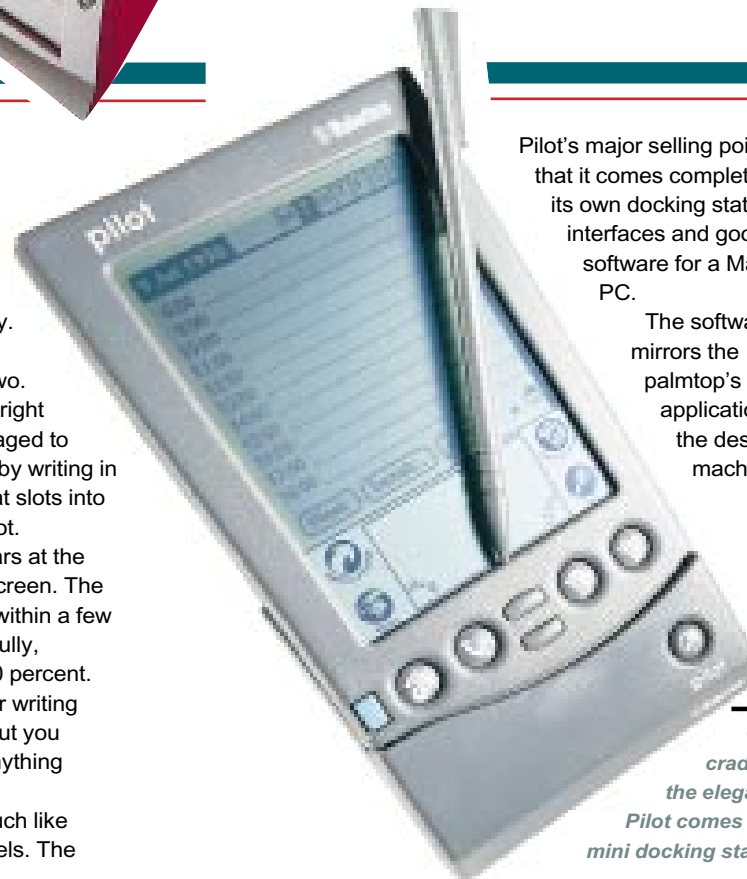
reverse tabs for navigation.

The lower inch of the display has icons for context-sensitive menus, added applications, a calculator and a search facility. Between these is a 1.5in x 0.75in writing area split into two.

The left side is for letters, the right for numbers. You are encouraged to assist the recognition engine by writing in large letters using a stylus that slots into the right-hand edge of the Pilot.

The recognised text appears at the cursor position in the upper screen. The Graffiti script can be learned within a few minutes and if you write carefully, recognition can approach 100 percent. This makes the Pilot viable for writing short memos or addresses, but you would hardly use it to write anything longer.

So far, the features are much like those you get with other models. The



Cat's cradle... the elegant Pilot comes with a mini docking station

Pilot's major selling point is that it comes complete with its own docking station, interfaces and good software for a Mac or a PC.

The software mirrors the palmtop's applications on the desktop machine and

provides a "hot sync" function which, at the touch of a button, reconciles the data on the linked machines. This means you can easily dump the numbers you collect on the road into an office machine, or bring your Pilot-held schedule up-to-date on office-made appointments.

Translation software in the pipeline will allow similar sync-ing with leading desktop modules such as Microsoft Schedule.

The Pilot runs on a Motorola 68328 chip and Palm's own operating system. There are two models, the 1000 and the 5000, costing £279 and £349 (plus VAT) respectively. Palm is curiously coy about how much memory there is, but the 1000 is said to hold 750 addresses, a year's appointments, 100 to-do's and 100 memos. The 5000 holds five times as much, and a £129 memory upgrade will support up to 10,000 records.

There is no PCMCIA slot, and all add-ons will have to use the same non-standard ten-pin edge connector as the

docking station. US Robotics is expected to offer a modem.

This is an elegant design which is actually useful. Which is more than can be said for some pen-driven palmtops. With so much in the offing for mobiles — the USB port, promising universal docking (see *Newsprint*), portable network computers, and fast infra-red links — it could quickly become dated.

Clive Akass

PCW Verdict

Good Points Low cost. Pocketable. Dockable. Usable.

Bad Points Expansion options are non-standard. Limited connectivity.

Conclusion Good value and likely to win fans. But keep an eye on the horizon.

Price Pilot 5000 £349; Pilot 1000 £279; memory upgrade £129. (All plus VAT).

Contact US Robotics 01734 228200

HARDWARE

Compaq DeskPro 2000 (Tomcat)

A new departure for Compaq, with a low-priced PC for corporate users.

The war of the corporate PCs is heating up as never before, and cut-throat pricing has become the new battleground. With the Deskpro 2000, codenamed "Tomcat", Compaq has launched a dramatic assault on the price front aimed straight at the Dells, ASTs and Digitals of this world. Once, when you heard the word "Compaq"; quality, but at a price would come to mind. It now seems that quality *and value* have entered the Compaq lexicon.

PCW's exclusive look seems to confirm this. At an estimated final price of just over £800 (plus VAT), the Deskpro 2000 is one of the cheapest Pentium 100-based corporate PCs around, especially when compared to some of its competitors where there's a £200 difference. But the real question is what do you get for your £800-plus?

Like Digital, Compaq has used a new, soft white-coloured exterior to give the Deskpro a clean, crisp look. The front moulding is nice. There are two forward-facing expansion bays for any CD-ROM or tape back-up devices you want to install. If you opt to include a CD-ROM drive, Compaq will bundle an eight-speed as standard. To the rear there's a serial, parallel, and integrated video connector. The PS/2 keyboard and mouse ports are cleverly colour-coded to ensure that the less computer-orientated user plugs them into the correct connector port.

Our review model was a higher spec and hence a higher price. It came with a Quantum 1.08Gb EIDE hard drive and 16Mb of EDO RAM. With these extras, the Deskpro 2000 is expected to retail for just over £1,000 (plus VAT). The minimum spec for the Pentium 100 model includes a 630Mb hard drive and 8Mb of EDO RAM as standard. Memory is expandable to 128Mb. With five expansion slots (two PCI/ISA, one PCI, one ISA), situated on a vertical riser board, there's more than enough room for any network or other add-on cards you may require.

Video capability runs from an integrated Cirrus Logic GD-5436 graphics chip with 1Mb of EDO DRAM (upgradeable to 2Mb). The downside is its poor maximum non-interlaced refresh

rate of 60Hz at 1,024 x 768 in 256 colours. This is well below the 72Hz recommended to avoid screen flicker and potential eye strain.

Reducing the resolution to 800 x 600 in 256 colours defaults the refresh rate to 72Hz, but you'll have to upgrade to 2Mb of EDO DRAM for acceptable refresh rates at higher resolutions.

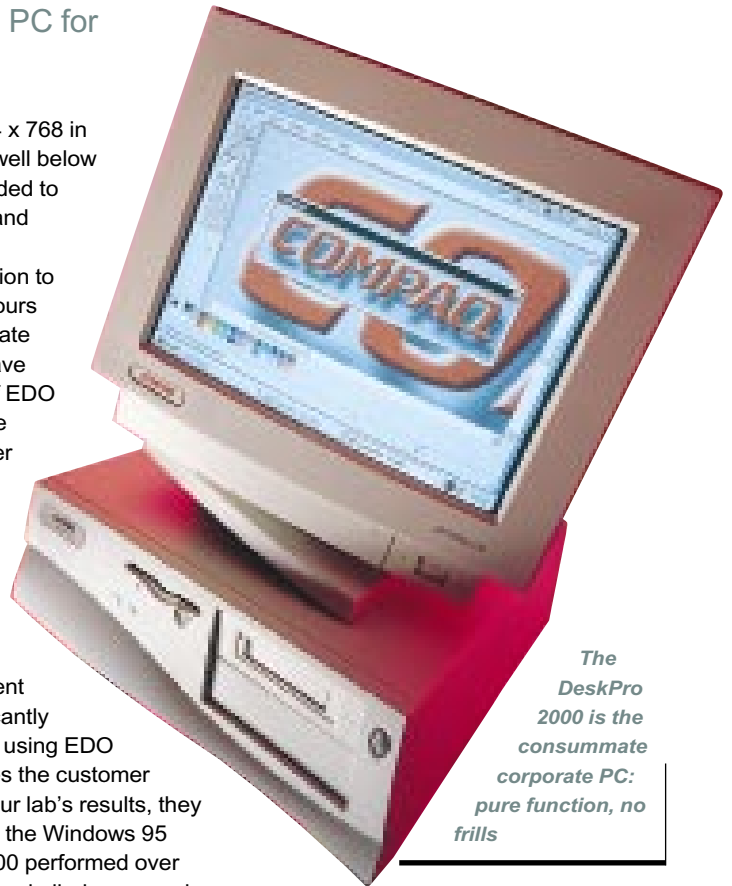
Compaq is now using the Triton II chipset, but they've opted not to include level-2 cache as standard, based on the argument that it doesn't significantly boost performance if using EDO RAM and that it saves the customer money. Judging by our lab's results, they appear to be right. In the Windows 95 test, the Deskpro 2000 performed over one third faster than a similarly specced, and cacheless, Dell P100.

The most interesting thing about Compaq's new roll-out of the Deskpro line are the three user tiers: Entry Level, Mainstream and Power User. Entry Level consists of the Pentium 100-based PC while the Mainstream leaps into the higher-clocked 120, 133, 166MHz Pentium and 180MHz Pentium Pro processors. All have more RAM, larger hard drives, level two cache, eight-speed CD-ROM drives and the choice of Windows 3.1, Windows 95 or Windows NT 3.51 operating systems. At the top of the range, a Power User model will be

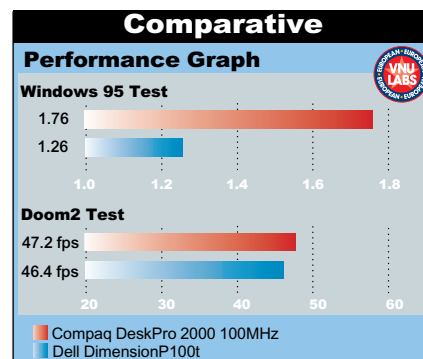
shipping using the Pentium Pro 200MHz.

No extra software other than the operating system is shipped with the Deskpro but there is an excellent set of asset management utilities. Whether using the Deskpro as a standalone unit or in a network, you can track components, monitor potential hard drive faults, check system configurations and more, all from one enabled terminal. Monitors aren't included in the £800 price so you can expect to add anything from £235 for a Compaq 140 14in monitor to £840 for the top-of-the-line 17in Compaq Qvision 172.

Dylan Armbrust



The DeskPro 2000 is the consummate corporate PC: pure function, no frills



PCW Verdict

Good Points Well designed. Good performance.

Bad Points Not enough video memory for higher monitor resolution/refresh rate.

Conclusion Only by corporate standards is it cheap. It should cause a stir.

Price £1,000 (plus VAT) as tested; £800 (plus VAT) for the basic model.

Contact Compaq 0990 134456; www.compaq.com

SOFTWARE

Corel WordPerfect Suite 7

An office suite with a whole host of features and a reasonable price tag.

The contents of Corel's suite is a fair representation of PC software history. WordPerfect 7, is a descendant of the erstwhile DOS market leader, acquired by Novell and sold on to Corel. Spreadsheets are represented by Quattro Pro 7, originally from the Borland stable. Presentation graphics are supplied by Presentations 7, a direct descendant of DrawPerfect. In supporting roles are Dashboard, a Windows front-end owned by Starfish, the company set up by former Borland boss, Philippe Kahn, who took with him another descendant of a long-established DOS utility: the personal information manager, Sidekick, included here. Envoy electronic publishing originates from the WordPerfect/Novell camp, and Corel's own FLOW! handles flowcharts and other business graphics.

The desktop application director provides a launchpad for all this and there are various system-wide components like the QuickFinder and QuickViewer. There are 10,000 items of clipart, 150 fonts, and a screensaver. You'll need Win95, 8Mb of RAM (16Mb recommended) and 220Mb disk space.

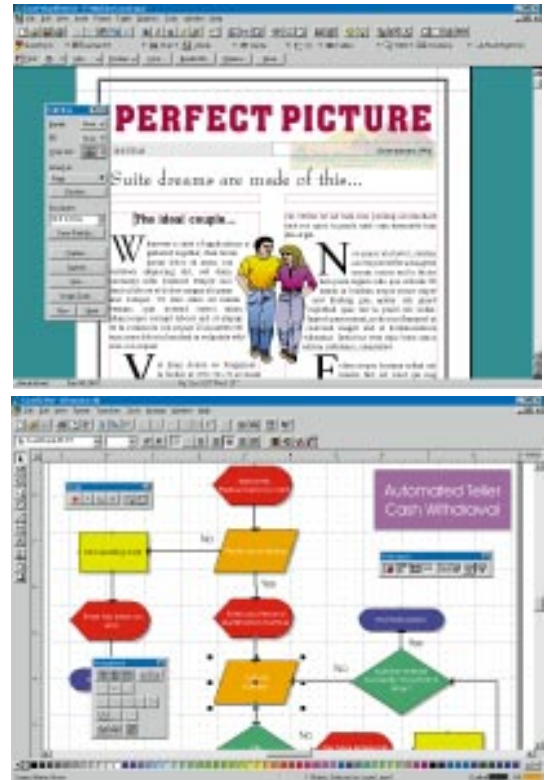
So, what's new? All the applications are 32-bit, giving Windows 95 advantages such as long file names, better multitasking and the elimination of the "system resource" bottleneck. WordPerfect 7 itself has new features. Added to the somewhat fragmented interface of power, tool and feature bars, are "QuickSpots". These are buttons that appear by a paragraph or graphic to summon a box of formatting controls. This is more like Word's floating toolbars than WordPro's more comprehensive InfoBoxes. Another novelty is the facility to move text boundaries like margins and columns by dragging on the dotted guidelines. There's the "shadow cursor", which tracks the exact point in the text to which a mouse-click will take you.

Catching up with Word, there's an as-you-go spell-checker, and a Quick List of recent fonts. Stealing a march on Microsoft, there's a load of built-in internet support. You can publish documents in HTML format, there's an "Expert" to help produce "My Very First Web Page" and you can convert web pages back to ordinary documents. For those using the postal system, there's a built-in address book available from all three major components.

Quattro Pro 7, the 3D spreadsheet, also boasts new internet connectivity. You can link a cell to a web page or FTP site to download financial information, for example. As in WordPerfect, it will publish to HTML. There are 100 new functions, with a Formula Composer to help deploy them, more chart options and better automatic filing of sequential data series.

Presentations 7 can link a slide "hot-spot" to an internet site, and you can convert slides to HTML format. There are some more transition and animation effects but it's basically business as usual with the customary excellent drawing and painting tools, including 3D text effects, and good multimedia support. FLOW! provides business diagrams from organisational charts to process control, with "smart" connectors that stay intact as you move objects around.

Envoy is an electronic hypertext document publishing system similar to Adobe Acrobat. Printing to Envoy lets you save any document in a form to be read and printed on a remote machine without the originating application. The recipient doesn't even need the Envoy software as both document and reader can be bundled into a single, executable, file.



Top WordPerfect's customary graphic skills and the new "Edit Box" floating palette

Above Corel FLOW! Smart charts but with a rather different interface

Integration is good in parts. Although the three main components share a similar look and feel, FLOW! is more akin to products like Corel DRAW! With many floating toolbars, Sidekick has a different interface again, and neither will share a spell-checker dictionary with the main components. Dashboard was originally developed to overcome the interface limitations of Windows 3.1, and although it's still an enhancement to Windows 95, there's an uneasy stand-off between itself, the Desktop Application Director and Windows' own shortcut facilities. There is a lot here, though, including a wealth of documentation and demos on the CD.

Tim Nott



Dashboard provides a new control centre for all of Windows

PCW Verdict

Good Points 32-bit versions with extensive internet awareness.

Bad Points Could be better integrated. The WordPerfect interface is still awkward.

Conclusion A lot for your money, if you have the time to learn it all.

Price £199 for the CD; £288 CD and floppy (both plus VAT)

Contact Corel 0800 973189

HARDWARE

H-P Pavilion 7130P

A new, easy to use P133 machine, tailor-made for family use.

It used to be that "home PC" was a label manufacturers could attach to a recently superseded model in order to give it a new lease of life before consigning the leftover stock to a box-shifter. Things are different now. The demands made on hardware by Windows 95 and current software mean that a home PC has to rank much higher in the performance scale.

H-P's Pavilion 7130P falls some way short of being a power-user's platform with its motherboard-mounted S3 Trio64V+ video system having only 1Mb DRAM and the 16-bit Crystal CD432 sound system requiring an upgrade for wavetable synthesis. Neither is there any standard Level-2 cache, although a COAST socket for up to 512Kb is provided. But a home PC driven by an Intel 133MHz Pentium with 16Mb EDO RAM and a 1.62Gb Conner hard disk is not to be sneezed at. With its six-speed CD-ROM drive and the option of adding a second meg of DRAM to the video system, it's capable of running everything the home user may throw at it.

What makes the Pavilion particularly well-suited to its target market are the enhancements Hewlett-Packard has added to the basic package, making it less threatening and easier for the whole family to use. The mini-tower case has been embellished with a sculptured, soft-contoured fascia and, at the rear, a plastic shroud hides the usual metallic backplate and incorporates colour coding for the ports and sockets. These match similarly-coded cables and connectors, making it virtually impossible to confuse what goes where.

The free-standing Altec-Lansing speakers are supplied with the system unit and can be plugged into the back of it. But they're also designed to clip onto the side of the monitor if you opt for the 15in multimedia display. When used in this mode, they offer acceptable sound accompaniments to programs but if you crank up the volume to play audio CDs, there is inevitably some slight display distortion due to vibration. The monitor offers a crisp, clear, image and copes well at 800 x 600 with 16-bit (65,536) colours. This is the optimum resolution, the colour depth dropping to 256 colours at 1,024 x

768 (NI) unless you increase the video RAM.

The Pavilion's most interesting feature is the PhotoDrive scanner, from Storm Primax, that is mounted under the CD-ROM drive. This 24-bit scanner with up to 400dpi optical resolution, 2,400dpi interpolated, is for photographs up to 7in x 5in which are simply "posted" into a slot on the front and automatically scanned as they are ejected. The actual scan area is 6in x 4in and the EasyPhoto software offers simple access to scanning options, cropping and the permanent storage of the resulting images. For more sophisticated editing, Softkey's PhotoFinish is supplied.

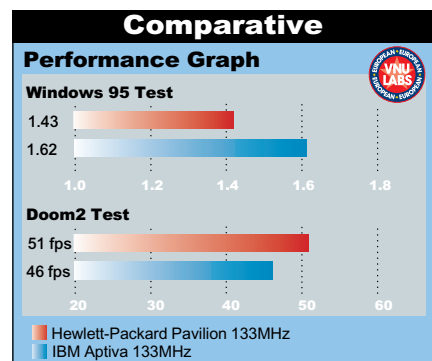
A lot of thought has gone into the installation instructions you see on opening the box. You're told how to unpack the monitor by turning it upside-down and sliding off the carton — not an obvious technique unless you're used to unpacking computer kit. By default, Windows 95 is shielded by H-P's own front-end system called Personal Page. Similar software supplied on Compaq, Olivetti and Packard Bell machines tends to defeat its purpose by completely subverting the way Windows works and making you start from scratch when you ultimately resort to a conventional Windows 95 interface. Personal Page enhances Windows 95 by hiding unnecessary options, adding large iconic graphics with audio help and providing instant switching between itself and the conventional Windows 95 desktop.

It's a shame that some of the other pre-installed H-P software, especially the

H-P's fully-featured home PC, complete with built-in scanner and a good-looking case

answerphone and speakerphone support for the 28.8Kb/sec GVC faxmodem, aren't as easy to use as Personal Page. There's a mix of productivity tools such as MS Works and Money, and plenty of games and reference titles for family entertainment. A nice touch is the inclusion of a bootable recovery CD that can completely reinstall the bundled system and application software in the event of a disaster.

Paul Wardley



PCW Verdict

Good Points Attractive design. Ease of use. The built-in PhotoDrive.

Bad Points A bit pricey.

Conclusion You can buy the same performance for less money but the genuine first-time buyer will appreciate the thoughtful design, ease of use and the 24-hour local phone number support.

Price £2,587 (Incl. VAT)

Contact Hewlett-Packard 0990 474747

HARDWARE

Epson Stylus Color 500

If you want photo-real printouts, you'll have to spring-clean it first.

Epson has introduced the Stylus Color 500 to replace its Stylus Color II. It is selling this printer alongside the claim that it gives "photo-real" printouts on plain paper. It is a four-colour, two-cartridge machine (one black and one CMY), which produces an astonishing 720dpi output.

First impressions of the printer were not good. The first pages we printed on copier paper were terrible, as the type bled badly. To correct this, we had to run the cleaning cycle several times and use Epson's own paper.

The amount of cleaning needed was a trifle excessive. Even after fitting new cartridges, the cleaning cycle had to be run several times to be sure of a clean output. This takes time: when new cartridges are loaded, it takes the printer about five minutes to set itself up. Subsequent cleaning results in the passing of more unproductive time.

Epson produces its own plain and high-gloss paper. At £10.99 for 100 sheets, the plain paper is expensive while

high-gloss paper comes in at £22.99 for 15 sheets. The plain paper is designed for 720dpi printing and the printed result is of a high standard. And so it should be, for the price.

Colour printing on Epson's plain paper is impressive. Although not quite "photo-real", it is an improvement on the average inkjet colour output on plain paper. The best settings for colour printing are in the "automatic" mode. Here, images are scanned and the optimum setting is chosen for each object. This produced better results for photographs than the actual photo setting, although in both modes there was a slight lack of definition.

Speeds were reasonable but not outstanding. It takes over ten minutes to print out a full page of colour and just over four minutes for a full page of type.

Adele Dyer



It's colourful, but the upkeep costs could have you going bananas

PCW Verdict

Good Points Splendid colour printing on the right paper.

Bad Points Expensive paper needed for good printing.

Conclusion Weigh the cost of ownership carefully: the paper makes this a more expensive choice than at first appears.

Price £250 (plus VAT)

Contact Epson 0800 220546

SOFTWARE

SoftQuad HoTMetal Pro 3

A technically accomplished, but intimidating, HTML tool.

SoftQuad was the first in the market with an HTML editor, but this counts for little if you don't extend your lead. The good news is that HotMetal Pro is now in line with HTML extensions such as frames, tables, Java applets and even Active X. But then, these days, any self-respecting HTML editor should support all those, especially one that styles itself as the professional's choice.

The bad news is that it's as intimidating as ever, and insists on plastering horrible HTML tag representations all over the editing window. The menu bars now present 67 buttons. One of these is the browser preview. The preview won't jump to the front, though, or even within the same window, like PageMill. If you are running HotMetal Pro at full-

Buttons? We got 'em. SoftQuad wins no prizes for the interface of HoTMetal Pro 3.0 which is as intimidating as they come

screen, you can't see the preview. That is poor software design.

The drag and drop capabilities of adding text and graphics to pages shows promise. Files can be taken directly from directories and viewed within the editing window. HotMetal checks HTML on-the-fly and warns you of conflicts, which is good, although it assumes the user understands those conflicts.

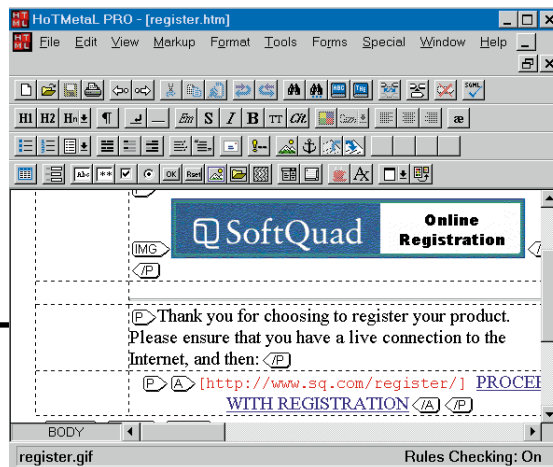
The claimed WYSIWYG editing of

tables is incorrect. Anyone who has experience of HTML and tables will know that what appears in an editing window is far removed from what the browser can display. HotMetal is no exception.

HotMetal still fails as a web design package. It includes a number of ready-made templates and GIFs but the standard of design on these templates is low and few would want to use them. The wizard-driven templates in rival packages such as FrontPage, or Luckman's Web Commander are better and far more contemporary.

SoftQuad has produced a technically-accomplished HTML tool, which does nothing to further the cause of design-led web editors. SoftQuad is a document management company and it shows.

PJ Fisher



PCW Verdict

Good Points Supports Java, ActiveX, frames and HTML 3.0.

Bad Points Cold, unappealing interface will please only technicians.

Conclusion If you know HTML, it will make your process faster. Expensive compared with the all-inclusive FrontPage.

Price £99 (plus VAT)

Contact SoftQuad 0181 236 1001; www.sq.com

HARDWARE

Digital Venturis FX5100

A new range of good-looking office desktop PCs, which are easy to upgrade.

What do you do if you want to make your new range of desktop PCs stand out? The answer that Digital's marketing team came up with was to make them white. Not just any old white, but "frost white". But fortunately, there is more to this new range than just a lick of paint. The machine tested here was the 100MHz 16Mb 1.2Gb mid-level "slimline" unit. Also in the range are 75MHz, 133MHz and 200MHz machines (all Intel Pentium). Digital offers a more expandable mini-tower version, as well, with similar specifications.

The casing, front-panelling and monitor-casing are of a superior finish and feel tough, although the white is likely to show dirt quickly. Real thought has gone into making this range easily upgradeable and highly accessible. Removing the lid involves unscrewing a single spring-mounted thumb-screw, which is held in place so you can't lose it. The lid should theoretically slide off with ease but the rough edges of this pre-production unit made this unworkable.

Inside, the ingenuity of Digital's engineers becomes apparent. A new motherboard/riser design means that the motherboard can be slipped out by unlocking two flipper catches and nothing else. The process is completed in seconds. No cables or cards are attached to the motherboard but are instead located on the riser board. Unlike the cover, the motherboard was extracted as easily as Digital promised. Here's a PC that has been designed with both performance and serviceability in mind.

There are compromises, though. Having all the PCI and ISA slots on the riser means that your choice of cards will be limited. The cabling route for the CD-ROM drive means that at least one board can only be half-length. There are two PCI and two ISA slots in all. The retention of ISA slots is deliberate: according to Digital's experience, many companies have old ISA network cards still in use, which are recycled in new PCs.

In keeping with Digital's policy of making the new Venturis future-proof, the Pentium processor sits in a ZIF (Zero Insertion Force) socket, making chip upgrades easy. The standard of

The new Venturis will turn heads on the desktop but Digital's pricing policy is likely to keep people away

manufacture and cabling is above average and the layout is neat. The cooling fan was missing from its innovative cowling structure which ducts air directly to the Pentium chip but we are assured these will appear on production units.

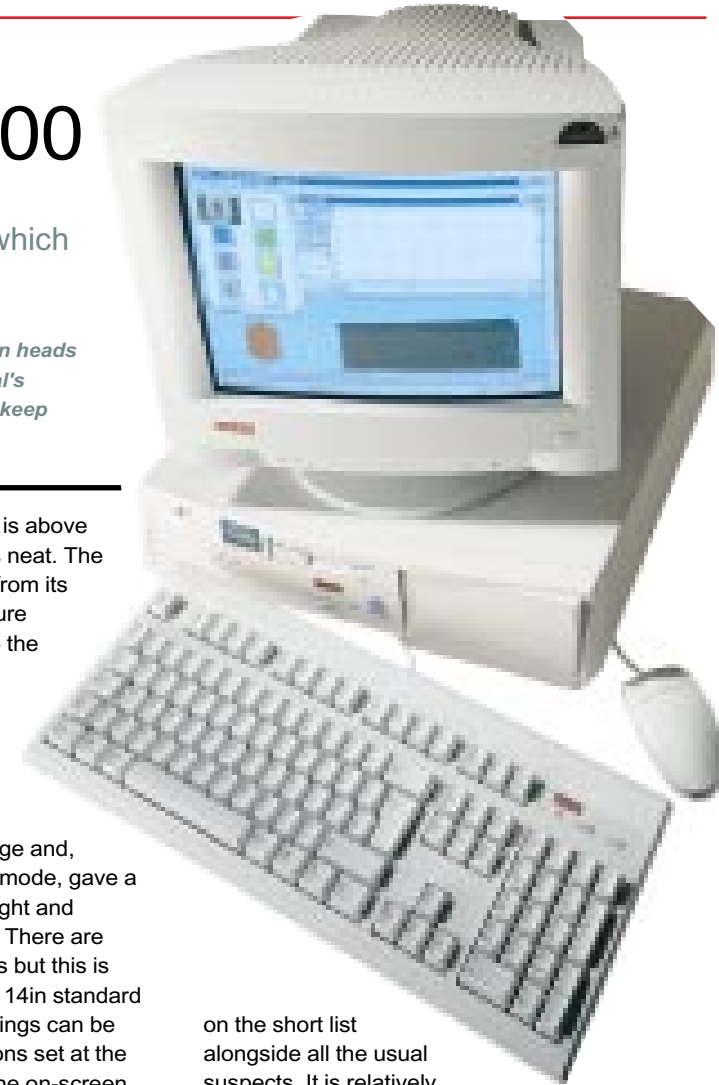
The Korean-sourced 14in monitor (17in also available) is above average and, in 800 x 600 16-bit 85Hz mode, gave a picture that was crisp, bright and comfortable to work with. There are better third-party monitors but this is superior to most bundled 14in standard displays. Adjustment settings can be carried out via push-buttons set at the front of the monitor and the on-screen display. The Venturis FX5100 is equipped with an on-board Trio S3 graphics chip and 1Mb of EDO RAM for video memory, upgradeable to 2Mb.

Two expansion bays will house a CD or tape drive. The review unit came without CD drive and installing our own proved awkward when sliding the casing back over it. Digital offers an optional six-speed CD-ROM drive. Mouse and keyboard cables are colour-coded; a positive touch which more manufacturers should emulate.

The software bundling reflects changing times. Windows 95 and WFW 3.11 are pre-loaded and the first boot gives you the choice of which to fully install. Digital provides its own Getting Started tour as well as Netscape Navigator and Microsoft Internet Explorer.

No office applications are bundled but Digital obviously expects these to be installed by business buyers, themselves.

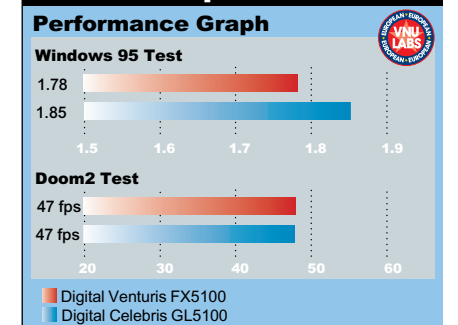
The Digital Venturis deserves a look as this is clearly more than just a set of old components in new clothes. If you are thinking of upgrading the company fleet, the new Venturis range is worth putting



on the short list alongside all the usual suspects. It is relatively overpriced considering the mid-speed chip and lack of multimedia.

PJ Fisher

Comparative



PCW Verdict

Good Points Good looking. Internal design tricks make upgrading simple.

Bad Points Relatively pricey for the configuration.

Conclusion Innovative internal design, but expensive.

Price £1,336 as tested (plus VAT)

Contact Digital 0345 227228; www.pc.digital.com

SOFTWARE

Adobe Premiere 4.2

A doubly-good 32-bit version for wanabee movie moguls.

With Adobe Premiere you can create and play movies using video, sound, animations, photographs, drawings and text. You import these media as clips, place them on a timeline in tracks (there are 99), add effects such as transitions, and mix it all into a single movie which can be output in various file formats, or back onto tape.

Premiere also has facilities to record video and, if you have the right hardware, it will control it for batch processing. It can create EDLs (edit decision lists), too, so you can transfer your work to a professional studio. The package is very rich in features but here we'll concentrate on what's new since version 4.0.

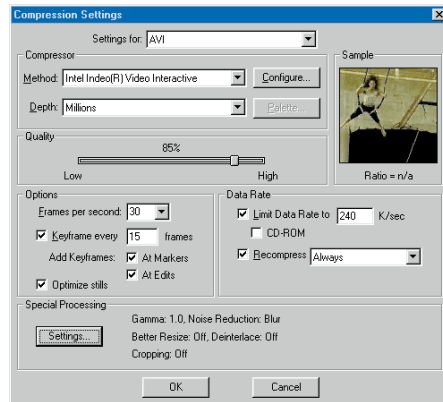
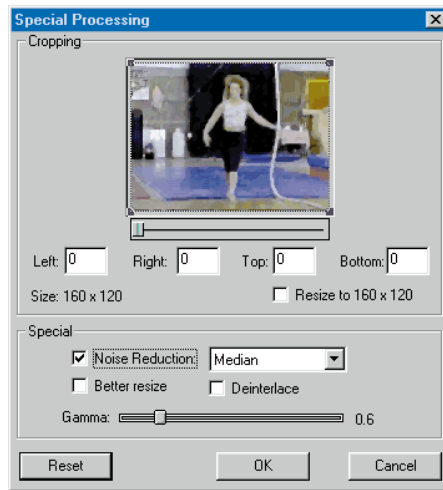
Premiere 4.2 is now a 32-bit program for Windows 95 and NT, said to provide two and a half times the performance of the previous version, with top performance expected under NT. Of course, the speed at which you can capture and render video depends on many things (such as hard-disk and machine performance) so we can't verify the claimed increase. However, the new version is significantly faster on my machine.

Many of the Windows 95 enhancements you would expect are there: long filenames, use of the right mouse button, and Uninstaller, as well as some overdue features like tool tips. More importantly, however, are facilities directly allied to video editing. One in particular makes upgrading worthwhile by allowing you to set key frames at marked points and at edits: a key frame is a full frame (rather than an in-between one) which contains only information on the differences between frames. Most video compression methods place key frames at regular intervals, which is fine except for situations where you have, say, a complete change of scene. Premiere 4.2 lets you put a key frame wherever you like. Setting them at irregular positions is useful, too, for jumping to a particular frame as happens with interactive videos.

Top The new noise reduction features

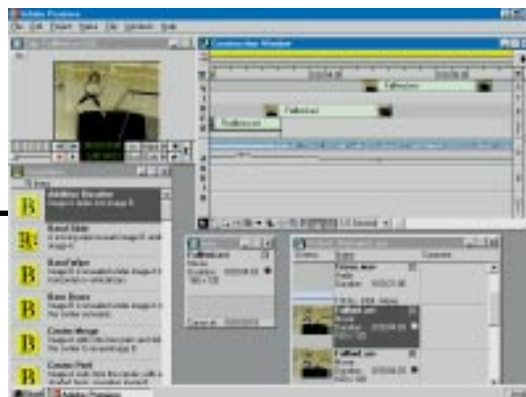
Middle The movie settings, showing the new key frame features

Right The main screen, showing all the windows



Another worthwhile feature is the use of Median and Gaussian blur filters. Video compression is much affected by signal noise stored unnecessarily as meaningful information and wasting valuable disk space. The filters give a better content-to-file-size ratio.

Lovers of special effects will also appreciate both the Camera View filter for creating 3D effects (with six manipulation controls) and the Lens Distortion filter for achieving the type of effect you can see on MTV. Although similar effects were



previously available, you can now rotate a clip around a 3D axis, and zoom in from a small area to fill the screen. In addition, a gamma correction option lets you eliminate some of the results of bad lighting by altering the brightness of the mid-grey levels and leaving the extreme bright and dark areas unchanged.

Premiere 4.2 bundles the new Indeo Video Interactive drivers from Intel (not yet available as standard with Windows 95) which give higher frame rates and frame sizes with lower file sizes, for creating AVI files that come close to MPEG quality without hardware decompression. Additionally, you get Quicktime for Windows (you can now compress Quicktime movies in Windows), Photoshop LE a photo-retouching program which can import/export files to Premiere as filmstrips, Crystal Flying Fonts for creating flying logos, Acrobat Reader, and Adobe Type Manager as well as Premiere 4.0a for Windows 3.1. Background compiling frees the computer while a preview or movie is being rendered and a batch movie-maker processes movies while you sleep — making a cup of tea is too quick for it!

The new version also enables you to switch audio channels, so you can correct such filming mistakes as trains passing left to right instead of the other way around. However, although the program allows up to 99 audio tracks and includes a number of audio editing facilities, you may need to use additional audio editing software. But even though the sound-editing facilities could be better, a useful feature worth mentioning is support for 8KHz sound for formats like ADPCM, TrueSpeech and CCITT. This means you can create movies which can be played over the internet using codecs such as VDOLive. In addition, you can now create iconic movies for the internet at an icon size of 32 x 32 pixels. Alternatively, you can edit movies with a frame size of up to 4,096 x 4,096 for output to photographic film.

Panicos Georgiades and Gabriel Jacobs

PCW Verdict

Good Points Rich in features. Third party support.

Bad Points Audio facilities could be better. Price.

Conclusion Still in the lead.

Price £380 (street); upgrades £25 to £105 (all prices excl. VAT).

Contact Adobe Direct 0131 4516888

HARDWARE

Plasmon CDR4240

A CD-R package to die for.

Convention has it that products are marketed either on price or on quality. But along Plasmon, with a CD-Recordable drive which is not only the cheapest on the market but is also claimed to be about the best — I just had to see this for myself.

The Plasmon CDR4240 is available in a number of configurations for internal and external fixing for both the Macintosh and the PC (the PC internal costs the least).

Optional software bundles have been planned but prices for these and other variants have yet to be decided.

The PC external version with a minimal software bundle was provided for this review, though I use the word "minimal" lightly as it contains an impressive package of fully-featured CD-R utilities. The CDR4240's 5.25in mechanism is made by Panasonic and fitted with Plasmon's electronics and software. It is capable of reading at up to quad-speed and writing in single or double-speed. The external box, with its built-in power supply, has a reassuringly solid feel and the overall impression of the package is one of quality. Internally, things get even better with Plasmon bringing to the market two very significant enhancements to CD-R technology.

Firstly, the CDR4240 is capable of using a technique called Packet Writing which allows the host PC to write data to the drive, 1Mb at a time. Existing CD-Rs require all the data for a disk to be sent at once, with no breaks, which is very inconvenient if your PC suddenly starts doing something else while you're recording. Although CD-R applications don't yet support Packet Writing, they will in the future as it opens up the possibility of writing CDs in the background while you work on other things.

Another problem Plasmon has solved relates to the type of blank disk it uses. There are eight manufacturers of CD-R disks worldwide. Some produce several types of blank and they are all different. CD-R drives are generally optimised for one type and are therefore less reliable when used with others. A few drives attempt to measure the reflectivity of the blank's surface and calibrate themselves accordingly, but the results are variable. The Plasmon is the first to actually read



A complete and innovative CD-recording kit at a budget price

system. This means you can use it to stuff all your files onto CD-ROM so that you have a sporting chance of finding them again.

In case it isn't obvious by now, I liked the CDR4240. It is arguably the best CD-R drive and

software package available, at any price. And it's also the cheapest on the market. You could quibble that it doesn't do quad-speed recording, although experience has shown that quad-speed drives are more reliable at double-speed anyway. The case is also very Mac-like which may put off the odd Applephobe, but I liked it.

Plasmon has certainly upped the ante with this product, in a way in which Hewlett-Packard, Philips, Yamaha and the other big players can't ignore for long. At the moment, however, Plasmon is actually offering the best quality at the lowest price and I couldn't find a catch.

Frank Leonhardt

the manufacturer's code from the blank and configure itself correctly. It can be software upgraded to cope with any new blanks which become available. Over the past month, I have been unable to find a type of blank which it didn't like. At last!

As if getting the drive right wasn't enough, Plasmon has pushed the boat out with the bundled software. The basic creation package is Incat's Easy-CD Pro. Not a cut-down version but the whole thing. With this you can easily create just about any CD format imaginable, including Audio and mixed. You can copy CDs, read and write individual tracks — in fact, just about anything. Versions are supplied for Windows 3.1, NT and 95 and a Mac version is also available. I've used most CD authoring packages in my time and this is the best I've come across so far. Also included is Easy-CD Backup which is adept at backing up hard disks to CD-ROM and Media Maestro (a very fancy video editing package with plenty of special effects). Optional bundles include Alchemy, an archive management

PCW Verdict

Good Points Probably the best CD-R package available. Certainly the cheapest.
Bad Points None found.

Conclusion A realistic competitor does not yet exist.

Price From £540 (plus VAT)

Contact Plasmon Data 01763 262963;
<http://www.plasmon.com>



SOFTWARE

Hurricane (for Windows)

Hurricane will optimise your PC's performance and boost memory usage whether you're working in Win 3.1 or Win 95.

As operating systems become more sophisticated, the need for add-on utilities wanes. But the arrival of Windows 95 has not killed the market altogether. About the time the new OS was launched, several memory management utilities came onto the market. These products were directed at Windows 3.1 users on the assumption that many would not migrate to the new OS because of extra hardware costs. The odd thing about Hurricane is that it's being marketed as a memory utility for Windows 3.1 and Windows 95. It's a set of utilities designed to boost memory usage and increase performance in either environment. But Hurricane is not a utility for the novice. If you're going to make the most of this software, then it must be configured accurately to take advantage of your hardware configuration and combination of applications. The manual is detailed and technical. Hurricane will install with automatic settings, but you must understand how it's tweaking your system should anything require tuning.

Hurricane consists of three major components: Hurricane Utilities, Discover for Windows, and Wingauge. The utilities component is the one which performs all the system fine-tuning and optimisation. Discover for Windows is an analysis tool which gives you useful information on your hardware and software setup, and Wingauge is a realtime facility which monitors your system resources on-the-fly. The whole thing comes on

one floppy disk and initial installation and setup is simple. Hurricane's files are put in a single directory and the only file which is altered is the system.ini, backed up with a .B4 extension. A de-install utility is supplied in case things go wrong.

Most memory utilities work by compressing some of the contents by allocating space for a compression buffer within system RAM. The idea is to hold as much data as possible in the memory, decreasing the need to access disk-based virtual memory which is much slower. The theory sounds reasonable but its implementation involves a performance overhead which can cause excessive paging of memory to disk.

Hurricane works differently. Instead of compressing main system RAM into an area of memory, it searches your system for unused memory regions and uses them as a compression buffer. One source of unused memory is your Video RAM. As video resolutions do not fit exactly into the amounts of memory provided by the memory chips, there is always some memory remaining for the RAM expander to use. The result is that paging from RAM to disk is not increased, and the benefits of compression are more

immediate. Under test, this proved to be the case: almost double the normal number of applications ran concurrently and large graphics files loaded in half the time. This the first memory utility I've used which makes a significant difference to Windows performance, and that goes for both 3.1 and '95.

Some of the fine-tuning is designed specifically for one operating system or the other, but many of the options are designed for both. Hurricane's Winpack places an extra button in the title bar of your Windows programs. This button appears to act merely as an extra Minimise button, but it compresses all code and data associated with the program while it is dormant. When the program is woken up again, WinPack dynamically uncompresses it which improves the use of system resources both in Windows 95 and Windows 3.1

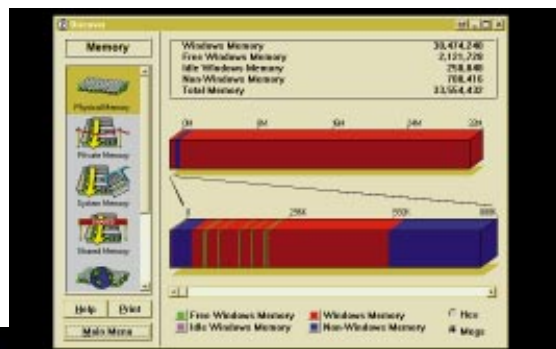
Wingauge displays dynamic information on all aspects of your system. The icons shown either side of the main gauges are warning lights which set off an alarm whenever you exceed 90 percent of a given resource or memory. When a warning light goes off help text appears, explaining your options.

Discover for Windows is the third part of Hurricane. It is a complete system analysis tool which is able to report all your hardware components including processors with Overdrive chips BIOS settings, and all your IRQ and DMA settings. It provides information on your entire software setup and a report of the way in which your system is using different types of memory. Discover is obviously a more useful tool for Windows 3.1 users, as many of these system details are built into Windows 95 in the System Properties dialogue box.

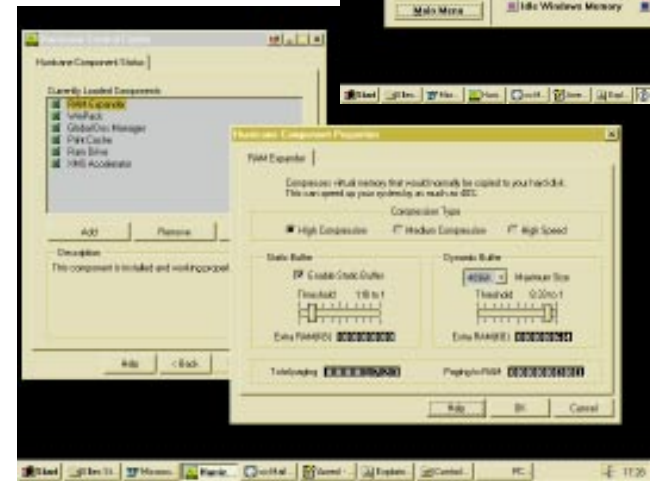
Hurricane is good value for a utility which boosts your system performance and provides analysis tools as well. With the price of RAM having fallen so much during the past year, consider your options carefully. Memory utilities, no matter how good, are no substitute for the real thing.

Eleanor Turton-Hill

PCW Verdict
Good Points Boosts performance in Windows 95 and Windows 3.1
Bad Points Requires an in-depth knowledge of memory configuration.
Conclusion Hurricane costs £49.99 and takes time to configure: 8Mb of EDO RAM costs about £89. So how much is your time worth?
Price £49.99 (plus VAT)
Contact Roderick Manhatten 0181 875 4444



Above Discover gives a realtime analysis of all your memory resources



Left All the Hurricane utilities are configured here in the control centre

SOFTWARE

TaxCalc '96

TaxCalc takes the headache out of tax returns and provides information on Self-Assessment, ready for April '97.

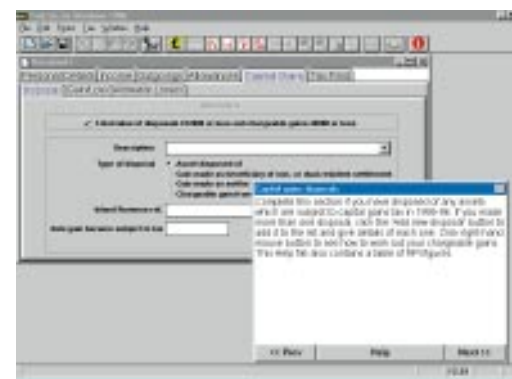
TaxCalc has been around for a while, but it only moved across from DOS to Windows last year. It is a quick and easy way to complete your tax return. Using a simple step-by-step "Interview" technique, TaxCalc requests the information it requires, such as details of your income and outgoings. Then the program calculates how much tax you have to pay, or how much the tax man has to refund to you. Don't be too quick to dismiss the idea that you're due for a rebate because at the end of the tax year

1994/95, one million people received rebates totalling £4.1bn.

TaxCalc '96 contains extensive hypertext-linked Help files which guide you through every stage of the form-filling and which, when printed, turn into an extensive reference book on taxation. In addition, the program comes with six of the most useful Inland Revenue leaflets, giving in excess of 40 tax saving tips about capital gains tax, company cars and much else besides.

TaxCalc '96 includes all three Inland Revenue approved tax returns, which can be completed, printed and sent in place of the actual tax return.

There are several new features and enhancements. The current tax rules and all 1995-96 forms, including the



Just answer the on-screen questions and who knows, maybe a tax rebate will send you to the Bahamas next year?

HARDWARE

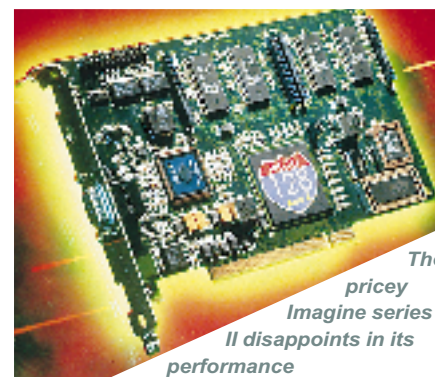
Number Nine Imagine 128 Series II

A high-end graphics accelerator with great utilities but lacking that deep-throated roar.

Reading the spec sheet in the manual you expect this graphics accelerator to be a technological barrier blaster. Being loaded with 4Mb of VRAM, 128-bit graphics engine, Cirrus Logic CL-5424 VGA chip, 2D and 3D capability, 256-bit video engine with bi-linear interpolation and a maximum resolution to vertical refresh rate of 1,600 x 1,200 in 16-bit colour at 83Hz, you would expect it to be a pretty heavy item wouldn't you? Yet our test results were disappointing.

Compared to the Matrox Millennium and the GrafixStar 600 (PCW, Aug), it's application test performance at 1,024 x 768 in 16-bit colour, was only just better than the 64-bit Matrox and less than the GrafixStar. It gave poor results, too, when running the Doom2 DOS test. Considering the price, one expects more than a five percent boost above the competition.

It's not all bad, however, for the Series II. Even though it's performance may be disappointing, it nevertheless has some of the best utilities I've seen. Number Nine's Hawkeye for Windows 95 utilities show real innovation. It lets you set custom refresh rates, zoom controls, cursor and screen colour/gamma correction. And there's the virtual desktop setting with windows placement and stop box features that allow toggling between two or more



The pricey Imagine series II disappoints in its performance

R40 which you need to claim a tax rebate, are included. The interface has been improved with the introduction of tabs to access data entry, and the Interview window is now movable. The Help files have been expanded and there is a new glossary. Printing has been improved, too.

Perhaps most important of all, it provides information on Self-Assessment, to be introduced in April 1997. Don't think that April is a long way off and you have nothing to worry about for a while: by law you have been obliged to keep financial records ever since April 1996 and by April 1997, you'll have to have your tax affairs up-to-date.

Maybe it's time to get to grips with tax now, and TaxCalc seems a good way to do it, but I think it is a little costly. Keep an eye open for a bundled deal with Quicken.

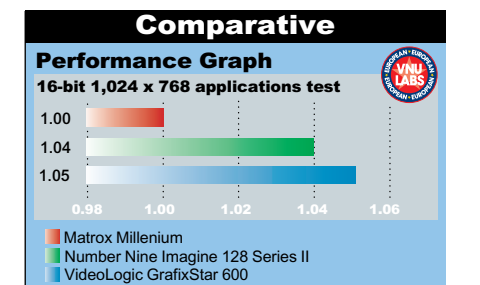
Paul Begg

PCW Verdict
Good Points Easy to use.
Bad Points A wee bit expensive.
Conclusion Will be much needed next year.
Price £29.99 (Incl VAT)
Contact Interactive Design and Publishing 01491 411590

applications running side by side, without having to constantly reactivate the application window.

The Imagine 128 series II is aimed at the high end of the market. The card is optimised to operate at high resolutions and colour depths for those who need them. But on a performance-to-cost ratio, Number Nine has a lot of convincing to do to entice potential customers from the Matrox Millennium or the VideoLogic GrafixStar 600.

Dylan Armbrust



PCW Verdict
Good Points Excellent utilities.
Bad Points Disappointing performance in our tests.
Conclusion Not enough bang for your buck.
Price £479 (plus VAT)
Contact Number Nine 01707 827926

SOFTWARE

Route 66

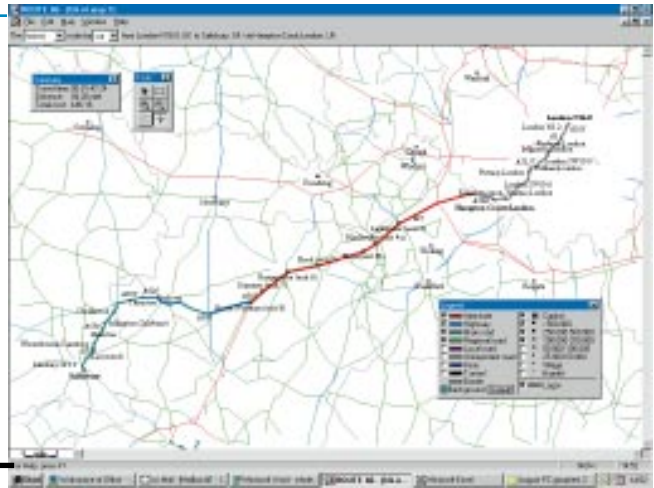
A simple, low-priced piece of navigational software.

Route 66 is a simple program for those with simple route-planning needs. Unlike Microsoft's Autoroute Express, this is a very basic application. There are no sophisticated features such as town biographies or golf course locations but it does the job. The program is only 61Mb in size which hardly stretches the CD-ROM's maximum capacity of over 600Mb.

Route 66 is aimed at the European market, with only one of the 12 map files covering North America. In Europe, you can plan a route from the western shores of Ireland to the Russian town of Arsk, at the foot of the Urals — but don't expect much detail.

Planning your journey is simple. Click on New Route from the menu bar and select your departure and destination points. You can include a "via" location, but it is here that this product's weakness shows. Route 66 limits you to only one "via", or way-point, unlike AutoRoute

An affordable, if simplistic, route planner. Good for motorway travel



Express which allows up to four.

As a business tool, Route 66 is adequate. Before you specify your journey, you must choose metric or imperial measurement, fuel consumption, fuel price, cost per hour, additional costs and expense allowance. It uses the awkward term of "gallons per 100 miles" instead of "miles per gallon" and on the speed settings menu, you'll find US terms such as highway and interstate. The time and distance calculations are accurate and the costing depends on what price variables you enter. The itinerary generated is a bit weak, especially when

you come across directions like, "Turn to unimportant road". Route 66 does its job, but it lacks the depth one now expects of this kind of software.

Dylan Armbrust

PCW Verdict

Good Points Runs under Win95, 3.1 and Macintosh.

Bad Points Thin on detail. Itinerary terminology can be unhelpful.

Conclusion Adequate for point-to-point travel. For the price, it does cover a lot of ground.

Price £29.50 (plus VAT)

Contact Ingram Micro 01908 260160

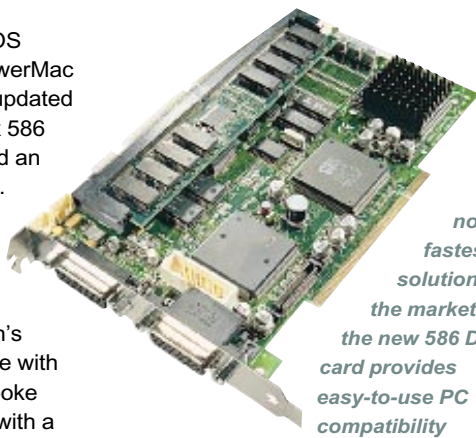
HARDWARE

Apple DOS Compatibility Card

Plug it in and run PC software next to Mac apps.

Following the success of its DOS Compatibility Card for the PowerMac 6100, Apple has announced two updated versions for PCI Macs: a 7in Cyrix 586 model and a 12in card built around an Intel Pentium. We tried the former. A DOS card plugs into your Mac and lets you run PC software alongside Mac applications. It's a lot faster than using a software emulator such as Insignia Solution's SoftWindows and more compatible with the many strange programs that poke about at the PC hardware. Along with a 100MHz Cyrix processor, the 586 card features a 128K secondary cache, an ATI Mach64 with 1Mb of display memory, SoundBlaster 16 compatibility, a joystick port and 8Mb of RAM (expandable to 64Mb) on a single 168-pin DIMM slot.

Setting up the card is more complex than with most Apple products, requiring some re-routing of internal audio and video cables, and it takes about 15



It's not the fastest solution on the market but the new 586 DOS card provides easy-to-use PC compatibility

minutes. You switch between systems, on the fly, by pressing Command+Return and the PC uses your Mac's hard disk, CD-ROM drive, floppy, ethernet port, keyboard and mouse. You can share data between Windows and the MacOS via the clipboard and setting up shared folders is simplicity itself.

In tests, Windows applications and

DOS programs installed and ran just as they would on a bone-fide PC. However, if it's speed you're after, the more expensive Pentium version may be a better bet as it has a bigger cache which can make all the difference. The 586 card will run office applications at a reasonable pace, although some games may prove to be too much for it.

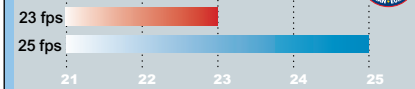
The DOS compatibility card is no replacement for a real PC, but if you want a one-system solution it's the best we've seen.

Chris Cain

Comparative

Performance Graph

Doom2 Test



Legend: Intel 486 DX2/66MHz (red bar), 100MHz Cyrix 586 DOS card for Macintosh (blue bar)

PCW Verdict

Good Points A tidy solution.

Bad Points Limited expandability. Relatively slow. Expensive.

Conclusion A good compromise.

Price £710 (plus VAT) Cyrix model; £885 (plus VAT) Pentium version.

Contact Apple 0181 569 1199

HARDWARE

Nakamichi SP-3d vs Sony SRS-PC300D active speakers

Get switched on to some high fidelity.

It's fair to say that multimedia has caught on in a big way. Sound cards and CD-ROM drives are now standard fittings on most new PCs, while upgrade kits are selling in huge numbers. One essential area that is often neglected, however, are the loudspeakers. It's common to see rock bottom budget speakers, selling for little more than a tenner, powered by the inadequate amplifiers sported on most sound cards. The resulting sound is awful, and an unfair representation of the quality sound sources that are increasingly available on PCs.

The solution is obvious: simply acquire a superior pair of speakers and plug 'em in. Here are two suitable products from respected hi-fi manufacturers Nakamichi and Sony, each costing around £130. But if stereo requires two speakers, why are there three each here?

Some time ago, a speaker manufacturer called Bose came up with the cunning solution for big sound from small boxes. The theory goes along the lines that high-frequency sounds are highly directional — you can spot exactly where they're coming from, while deep bass sounds are undirectional — although you can hear the sound, you aren't certain where it's coming from. The units to make deep bass sounds are big, but since they're not particularly directional, why not stick them in a single box which can be hidden under a

desk? The remaining high-frequency boxes would be very compact and could be placed conveniently in conventional stereo positions. Hence three boxes: two small mid/high frequency speakers placed on view, and a single sub-woofer to handle the bass, which can be kept out the way. Unfortunately, in practice there is plenty of sub-bass and high treble, but not so much mid-range. It sounds great for the first few minutes, and is undeniably convenient for those not wanting two big, conventional speaker boxes, but after a while, the sound begins to grate.

What grates for hi-fi music can be great for most computer entertainment applications, and the three-box solution is springing up everywhere. Sony and Nakamichi's triple-boxers both consist of two compact, magnetically-shielded high-frequency units, and a single sub-woofer. They both have built-in, mains-powered amplifiers. Beyond this, however, they are quite different.

Take looks first: Sony's boxy design is not my cup of tea, compared with the gracious curves of the Nakamichi. Both pairs of compact high-frequency speakers can sit on a desk or be mounted to the side of a monitor. Sony's kit features two line inputs and a mixer, compared to Nakamichi's single input. Sony's controls are located on the sub-unit, which could be inconvenient if located under your desk. Nakamichi's are fitted to one of the high-frequency units.

They vary enormously in sound quality. Nakamichi's has no bass adjustment, but the standard setting is subtle enough to reinforce the sound without being overpowering. The Sony's bass is adjustable, and it's tempting to whack it up to the maximum setting. At a three quarters, or



Sony: plain looks but big on bass

higher, bass setting the Sony really kicks, and while not high-fidelity it sounds great for games and rock or dance music. The Sony is lacking in high treble output though, coming across as slightly muffled compared to the crisp Nakamichi.

Both sets of speakers can be driven hard without distortion. We turned them nearly all the way up, in a very large room, and they coped admirably. While neither sound is nearly as good as a proper hi-fi amplifier and speakers, Nakamichi's product is certainly higher-fidelity. The range of frequencies covered is more complete, and much wider particularly at the high end. The sub-woofer subtly joins in to complete the picture, and the whole package looks superb.

But however much of a hi-fi snob I am, there's nothing like whacking up the Sony's bass when you're playing games. It may not be as refined as the Nakamichi, or as good looking, but for general computer applications, particularly entertainment, it has the edge.

Gordon Laing



Subtle hi-fi sound from Nakamichi

PCW Verdict

Nakamichi SP-3d

Good Points Looks good. Higher fidelity.

Bad Points Not enough bass for some.

Conclusion For image-conscious audiophiles.

Price Around £120 (plus VAT)

Contact AGP Distribution 01264 336991

Sony SRS-PC300D

Good Points Powerful, great bass, two inputs.

Bad Points Hardly hi-fi. Looks dull.

Conclusion Great for games and general multimedia.

Price £139 (plus VAT) RRP

Contact Sony 0181 760 0500

PCW How You Can Contribute To The Long Term Tests Section

We welcome contributions from readers for our Long Term Tests section. If you've been using a piece of hardware or software intensively for some time, just write a 450-word article (for hardware) or a 750-word piece with screenshot (GIF format) for software and send it on disk, in MS Word (Mac or PC) or ASCII format, to: Adele Dyer, Personal Computer World, VNU House, 32-34 Broadwick Street, London W1A 2HG. Mark your envelope clearly "Long Term Tests". Or email it to adele@cix.compulink.co.uk. We'll pay for any contributions we use.

HARDWARE**Umax PageOffice**

Document management system, including scanner, filing system and text recognition software. Great for light workloads.

THE FALLING COSTS OF DISK space and scanners have made electronic storage a viable alternative to the filing cabinet for small offices and home users. Departmental document management systems can cost thousands, even tens of thousands, of pounds, but you can buy a desktop version for well under £250 on the street.

They consist essentially of a scanner, to capture images of paper documents, and some kind of filing system usually including text recognition software. I handle several hundred press releases a month and my desk regularly disappears under piles of paper, so I decided to give PageOffice a field test.

The software comes with a Umax Page Scan platen scanner, for £249 (plus VAT).

The system was not designed for the weight of work I tried to put on it. The Umax's rudimentary paper-feed system can cope with a few pristine sheets but needs manual help if there is the slightest rick in the paper. Most paper that has come through the post has folds and often staples in it.

The scanning itself, triggered by a hotkey, is quick and easy, and the pages appear as thumbnails in the suite's PageManager module. From here they can be dragged and dropped for filing to another module, PageFile. This allows you to set up virtual cabinets, drawers and folders

for your documents. But again, it grows unwieldy with a large workload. Inexplicably, there seems to be no way to collapse the storage tree into simplified views.

The filing dialogue is cumbersome. It lacks user-friendly features like being able to default to the last file location, so it's best to look elsewhere if you want to automate your filing. From PageManager you can drag and drop an OCR (Optical Character Recognition) translation of a scanned document into the word processor of your choice. The OCR engine is good for standard, simply laid-out text but did not cope well with business cards, which were also tricky to scan. The rival Visioneer product is better in both respects.

A major irritation is that each drag-and-drop OCR operation opens a separate instance of Word. In fairness, though, this has been the case with every package of this type I have looked at. You can fax from within the PageManager and crop or align images. Another module allows you to annotate images.

The Umax scanner proved robust, giving not a speck of trouble over the months I used it, so I could recommend it to anyone wishing to scan in a few letters a day. You could accomplish more if you had time or a willing minion to take care of the paper feeds.

The software had the feel of a first edition, having a fairly good interface but some rough edges.

Clive Akass

PCW Verdict

Good Points Simple to use. Reliable.
Bad Points Clumsy filing.
Conclusion Okay for light duties.

Price £249 (plus VAT)
Contact IMC 01344 872800

PageOffice works well with flat sheets of paper, but needs manual help if the sheets are creased

**SOFTWARE****Delrina WinFax Pro Version 4.0**

18 MONTH TEST

A virtual fax which lets you send files down the line. Although it prefers to give rather than receive faxes, it does save time and money.

WINFAX PRO NOW EXISTS IN two versions: Version 4.0c, which runs under all the Microsoft Windows operating systems; and Version 7.0, which runs under Windows 95. In terms of functionality they are similar, although Version 7.0 is a 32-bit package designed for Windows 95. Version 4.0c is a 16-bit program with a few 32-bit elements, such as the correct drivers to run under Windows NT. I bought WinFax Pro Version 4.0 as an upgrade to WinFax Lite 3.0, which came bundled with a 14.4Kb X-Link modem from Watford Electronics. The upgrade cost me £35.

Originally I had not intended to use a virtual fax, but my existing fax machine was over four years old and, like most four-year-olds, was prone to throwing tantrums and ripping up important pieces of paper. So I gave WinFax a try and was extremely impressed: it worked well, both for incoming and outgoing faxes.

The best thing is that I can fax from within a document rather than having to print it beforehand. Having created macros within Word for Windows and Excel, the process is simple; and bypassing the printing stage not only saves paper but time and money, too.

Fax machines work by scanning the image into several lines of pixels before sending them down the telephone wires, and like most early models, my previous fax machine would scan the pages while online to the fax at the other end. But modern machines scan the paper, so creating a pixellated image as a file before connecting and sending the fax. WinFax Pro does this by creating a file before dialling. The process is similar to printing, in the way that the Windows Print Manager regards the fax software as another printer and uses an appropriate driver to convert a document to a file prior

to faxing it. My online time has been cut by about a third compared with when I used to send faxes by the traditional method.

I have been impressed with WinFax Pro. Some of its better features include a facility to view, manage and convert incoming and outgoing faxes, which means that I can preview a fax before despatch. And I can forward incoming faxes,

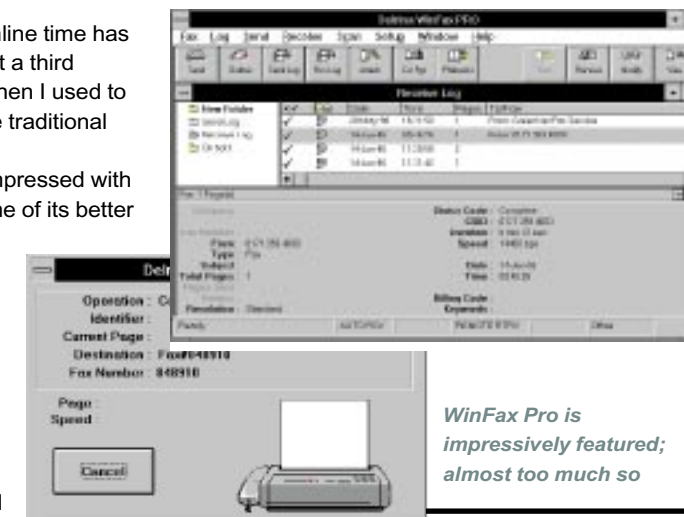
annotating them before sending them on.

WinFax Pro has some useful automatic features. I can pool faxes, operate faxback systems and schedule a fax for a later date. I find this latter feature especially useful for sending faxes overseas and saving on call costs. In addition, I can save a file in either .PCX or .BMP formats, and print any fax received or sent.

However, I think Delrina has tried to do too much with the Pro and there are some features which, for me, have been a waste of time. For instance, it has a vast array of front pages which I find about as useful as most clipart. The software purports to have an Optical Character Recognition package within it, yet compared with WordScan or TextBridge, the WinFax OCR is mediocre and so error-prone that I do not consider it worth using — I have had better results saving a fax as a .PCX file and then using TextBridge.

WinFax should allow me to dial in and retrieve faxes, but having tried this on several occasions using my laptop, I have never managed to get it working (two friends with WinFax Pro have experienced the same problem). Although the program allows WinFax users to send binary files, I have not yet been able to try this.

I have had two other problems with the package. Sometimes, when receiving a very long fax, it will simply hang up with no explanation. Although Delrina couldn't help with this, I eventually traced the problem to a bug in Word for Windows



6.0, which leaks memory under Windows 3.11 each time the program is loaded and closed. This means that WinFax can run out of memory during a long fax.

I found out about this problem through Bugnet, a special interest group on the internet, which collects information on those bugs which software developers don't publicise. The solution in my case was simply to reboot the PC under Windows 3.11 several times a day. Another problem, I have found, is that WinFax tends to crash if it is running in the background.

These problems tend not to exist under Windows NT 3.51, although I have encountered a snag while running under this 32-bit OS. At first, WinFax 4.0 did not work at all under Windows NT, until I got hold of the correct drivers from Delrina, which are now included in Version 4.0c.

So would I recommend WinFax Pro? If you do not already have a fax machine, then it is worth buying. If you do, I would advise keeping your machine for incoming faxes but using WinFax Pro for outgoing documents.

Rick Gould

PCW Verdict

Good Points Saves online costs.
Bad Points Can hang when receiving long faxes.
Conclusion Better for sending than receiving faxes.

Price £99
Contact Symantec 01628 592320

Personal Computer World's Preview of



LIVE '96

If you want to see, hear and play with the latest in consumer electronics, get ready for LIVE '96 — Europe's leading consumer electronics show. Running at Earl's Court between 25th and 29th September, it's the place to get your hands on tomorrow's technology, today.

This year, along with the usual attractions, organiser Blenheim has created a special feature, PC LIVE, to cater for the huge increase in demand and interest for home computing. Here you'll be able to see the latest products for the PC, meet the experts who created them, and get your questions answered.

As usual, manufacturers are playing their cards close to their chests about exactly what will be on display. However, to give you some idea of what's in store, last year saw over 180,000 visitors and the launch of some of the most interesting and innovative products on the market today: Windows 95 started up; Olivetti's Envision came on view for the first time; and Sony's ever popular Playstation and genuine 3D TV from Sanyo both saw their debut at LIVE.

Among the top exhibitors at PC LIVE will be: Microsoft, with the latest versions



Get down to LIVE '96 and be consumed with enthusiasm for consumer electronics! Your chance to get hands-on experience of tomorrow's technology, today

of award-winning Encarta and World Atlas titles for Windows 95, Olivetti, Packard Bell, Psion, Sanyo, America On Line, Europe On Line, UUNET Pipex, IBM, Creative Labs and Demon Internet. Sony will also be at the show, and rumour has it

that its brand new multimedia home PC, recently launched in the US, may well get its first UK airing at LIVE.

The Internet will feature heavily, and you can see the latest on-line by taking our Superhighway Walk.



Don't get left behind: be one of the crowd at September's LIVE '96 at Earl's Court

LIVE '96 Show Details

Dates: 25th September - 29th September
Times: 10am - 7pm every day (late night opening on Thursday until 9pm)
Place: Earl's Court - One and Two
Tickets: Adults £9.00, Children £5.00
 ● For tickets in advance, call the ticket hotline on 0171 396 4545.

But LIVE '96 is not only about new products — it's also about having fun. There will be a whole host of features designed entirely for your pleasure. For example, you can try your hand at being a DJ as Capital Radio will be at the show with all the technology in place for you to design your own jingle and try your luck at schmoozing the airwaves.

Perhaps you've always fancied yourself as a TV news presenter: well, you can do that too. BBC Newsround will be there with the Newsroom of the Future. Newsround will be broadcasting live from the show, but you will have the opportunity to appear in front of the camera to be captured for all eternity.

Or you might like to spot celebrities rather than be one for a day. You'll have

plenty of opportunities, as LIVE '96 has nominated NCH Action For Children as its appointed charity for the show. NCH Action For Children will arrange for a

whole host of celebrities to visit their stand at Earl's Court to help raise funds and add to the excitement.

Running alongside LIVE the same weekend is ICE '96, the In Car Electronics Show, which puts on a display of the most astounding array of hi-fi for your car.

The show will also play host to the final of the Maxpower/SCA Sound Off Series competition, and the longest limousine in the world — twenty one metres of sheer unadulterated luxury. It even has its own Jacuzzi in the back.

Microsoft/LIVE '96 Competition

To get the ball rolling on LIVE'96 we have ten copies of the award-winning Microsoft Encarta 96 multimedia encyclopedia and its companion product, Microsoft Encarta 96 World Atlas, to give away.

Encarta 96 Encyclopedia contains over 27,000 revised articles and allows the user to take a trip through a vast universe of knowledge which comes to life in front of your eyes. Encarta 96 is the most comprehensive encyclopedia in the world, and with monthly updates available on the World Wide Web and on MSN, you can be sure it is always up to date.

With more than one million place names, Encarta 96 World Atlas offers the most comprehensive geographical information of any world atlas, whether print-based or computer-based. Users can select almost any view of the world, from an aerial height of 2 to 50,000 kilometres, and explore the world behind the map to learn about a region's people and culture. Experience the world as it really is — round, not flat!

These well-designed multimedia titles have been adapted and updated to create an ultimate reference source for all the family. The



stunning animation, videos, maps, charts, sounds and pictures take the effort out of learning and make it fun for all the family.

For a chance to win these Windows 95 CD-ROM titles, just write your answers to the questions below on a postcard or the back of sealed envelope, and return your entry form to: Microsoft LIVE'96 Competition, Personal Computer World Editorial, VNU House, 32-34 Broadwick Street, London

W1A 2HG. Closing date: 29th September.

Questions

1. Name the six wives of the English king Henry VIII.
2. What is the capital of Outer Mongolia?
3. Microsoft will be launching a horde of new entertainment products at LIVE'96. Name three of them.

● This competition is not open to employees of VNU Business Publications, Microsoft, Blenheim or their families.

In the aftermath of its recent troubles, Apple has reorganised its product line into better price/performance combinations and the fastest Macintosh ever. Cliff Joseph reviews the speed-bump Macs.

Slicker Macs

DURING THE LAST SIX MONTHS, amid the wailing and gnashing of teeth that followed Apple's well-publicised troubles, the launch of the latest batch of Power Macintosh models has passed almost unnoticed. Admittedly, these new Power Macs don't offer any real surprises that might otherwise have made them especially noteworthy, but they nevertheless represent a fairly major reorganisation of Apple's product line.

Some models have been dropped altogether, while the remaining models provide better price and performance combinations. And, with the new Power Macintosh 9500/150, Apple has come up with the fastest Mac it has ever produced.

Power Mac 8200

There's been some fancy footwork from Apple UK at the low end of the range, with the introduction of the "new" 8200 series. Like the older 7200 series, the 8200 models are all based on the PowerPC 601 processor.

In the US, the original 75MHz and 90MHz versions of the 7200 have been dropped and replaced by the new 7200/120. This retains the desktop design of its predecessors and merely increases the CPU clock speed to 120MHz.

Apple UK has kept the 7200/90, dropping its list price to £1,150 (plus VAT). It comes with a 500Mb hard disk and quad-speed CD-ROM drive but only 8Mb of RAM and no Level 2 cache. That amount of RAM will let you run smaller applications such as ClarisWorks but most DTP and graphics software (and anything at all by Microsoft) will require 16Mb to perform efficiently, so you've probably got to think about another £150 (plus VAT) to upgrade the RAM.

Apple announced at its WorldWide Developers Conference in Cupertino that all Macs would in future ship with at least 12Mb of RAM. It wasn't clear, however, when this would take effect, nor how it would affect the current pricing structure. Remember, too, that Power Mac prices do not include a monitor or keyboard (though many mail-order dealers will throw in a keyboard more or less free of charge).

The 120MHz version of the 7200 will not be available in the UK — at least, not in its normal desktop case. Instead, Apple UK has taken the 7200 motherboard, flipped it on its side and housed it in a mini-tower unit. The result is the 8200 series, which is available only in Europe.

There are two versions of the 8200. The 8200/100 runs at 100MHz, and is supplied with 8Mb RAM, 1.2Gb hard disk

and quad-speed CD-ROM for £1,500 (plus VAT). But you'll probably need to take into account the cost of upgrading the RAM to 16Mb. This machine also lacks Level 2 cache — an irritating cost-cutting compromise which Apple persists with, long after the inclusion of high-speed cache memory has become standard in even the cheapest PC.

The 8200/120 raises the clock speed to 120MHz and includes a more sensible 16Mb of RAM and 256Kb of Level 2 cache. This pushes its price up to £1,875 (plus VAT), which is about £200 less than the old (now discontinued) 100MHz Power Macintosh 7500/100.

But despite the 8200/120's faster processor, its overall performance is fractionally slower than that of the 7500/100. This is because the motherboard of the 7500 supported memory interleaving: a feature lacking in the board used in the 7200 and 8200 series. Memory interleaving allows data to be divided into small blocks that are shared between multiple banks of memory, rather than being stored and retrieved in a single, sequential unit. This improves the speed of data transfer between the CPU and RAM.

As expected, the 8200/120 scores better than the 7500/100 on raw number-crunching CPU and FPU performance, but when it comes to disk and video performance, which involves the transfer of data between the CPU and other system components, the 7500/100 pulls slightly ahead.

The 8200/120 is noticeably weaker on video performance, due to a design quirk in its motherboard. The video subsystem uses a 32-bit data path when equipped with its standard 1Mb VRAM, but the data path increases to 64-bit if you upgrade to 2Mb or more (the maximum possible is 4Mb). This means that video performance should improve significantly when you add more VRAM. However, Apple was unable to supply a VRAM upgrade at the time of this review so we were unable to determine what difference this would have made to overall performance.

Even so, once the scores of the two machines are averaged out, the difference in overall system performance between the 7500/100 and the 8200/120 is scarcely noticeable.

The lower price of the 8200/120 should prove attractive to business users looking for a sturdy office machine, especially with the Ethernet and 10-Base-T interfaces that are included as standard, or to home owners who can

afford more than the bare bones 7200/90.

The 8200/100 seems less attractive, though. You'll almost certainly need to upgrade to 16Mb, and if you add 256Kb of Level 2 cache to get maximum performance from it, you'll find that you're at almost the same price point as the 8200/120, without the benefit of the faster processor.

But then, upgrade potential has always been one of the weaknesses of the Mac platform. You can upgrade most PCs simply by taking out the old processor and fitting an inexpensive Overdrive processor. Apple's idea of upgrading a Mac has generally been to replace the entire motherboard: a massively cost-ineffective way of doing things. Admittedly, it has at last seen the light with most of its Power Macs, and places their CPUs on replaceable daughtercards rather than on the motherboard. That's not the case with the 7200 and 8200 models, though. Their CPUs are soldered onto the motherboard, so upgrading these machines still requires a completely new motherboard.

Apple UK's decision to house the 8200 models in a tower unit makes them slightly more versatile than the US's 7200/120, as the tower unit can hold the motherboard of either the new 7600 or the existing 8500 models, both of which use a PowerPC 604 processor. The desktop case of the 7200 series can only be upgraded to 7600 level.

It's particularly useful to be able to upgrade to the 8500 as this includes built-in video input and output features in addition to its 604 processor.

Unfortunately, these upgrade kits cost a thumping £1,300 and £1,600 (plus VAT) for the 7600 and 8500 respectively. But there's worse news to come: insanely, these upgrade kits contain a motherboard, but not the daughtercard that holds the 604 processor. These cards, currently available in 120MHz and 132MHz versions, cost £450 and £675 (plus VAT). This means that even the cheapest upgrade will cost £1,750 (plus VAT), which is more than the 7200/90 and 8200/100 cost brand new.

This is appalling. Apple UK's response is that entry-level users probably won't be planning to upgrade for quite a long time following their initial purchase. That may be true, but when they *do* decide to upgrade, they should be able to do so for less than the price of an entirely new Mac. The lack of a sensibly-priced upgrade option is a major weakness in these machines.



Power Mac 7600/1200

Power Mac 7600/120

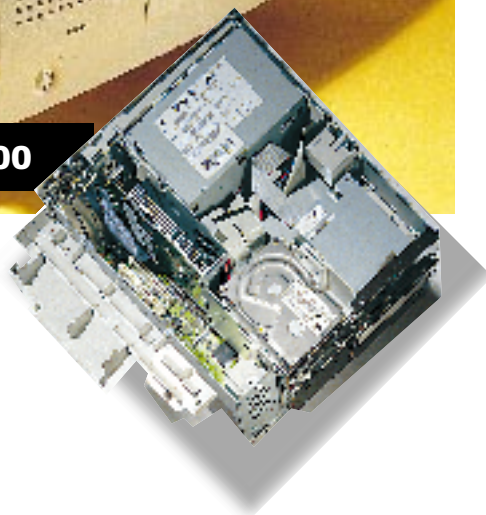
The Power Macintosh 7600/120 is a case in point. Replacing the now-discontinued 7500/100, this machine is nothing more than a 7500/100 that has had its original 601 processor card replaced by a new 604 daughtercard running at 120MHz. There's a 200Mb increase in hard disk size and 256Kb Level 2 cache provided as standard, but the machine's spec is otherwise identical to that of the 7500/100.

With 16Mb RAM and quad-speed CD-ROM drive it costs £2,400 (plus VAT), which is slightly more than what the 7500/100 originally sold for. However, the speed increase is worth it. Raw CPU performance is increased by over 30 percent and FPU performance by almost 50 percent. There are less substantial improvements in video and disk performance, but in overall terms the 7600/120 is still more than 25 percent faster than the 7500/100. This gives Apple's mid-range a welcome boost that should help it keep up with the continuing performance increase of Pentium PCs.

There's further upgrade potential in this machine, too. Later this year Apple plans to start using the PowerPC 604e in its product line. This has a clock-divider ratio of 4:1 which will allow the 50MHz motherboard in the 7600/120 to accept future upgrade cards running at speeds of up to 200MHz.

Power Mac 8500/150 & 9500/150

At the moment, though, the top of the Power Macintosh range stops at the 150MHz mark, as represented by the



new 8500/150 and 9500/150 models. These are simply speed-bumped versions of the existing 8500 and 9500 models, which have now been discontinued. The 132MHz version of the 8500 will still be available in the US, but Apple UK has chosen to drop that model altogether.

The 8500/150 comes in at around £3,400 (plus VAT) with 16Mb RAM, 2Gb hard disk, quad-speed CD-ROM and 256Kb Level 2 cache. The 9500/150 has 32Mb RAM, 2Gb hard disk, quad-speed CD-ROM and 512Kb Level 2 cache. That extra bit of cache allows the 9500/150 to



Power Mac 8500/150 & 9500/150

nudge slightly ahead in overall performance, so users looking for raw horsepower to drive Photoshop and other graphics and DTP applications, should continue to look to this model as their top-of-the-range workstation.

One slight change of tack, though, is that the 9500/150 now includes an ATI graphics card as standard. When the 9500 series was originally launched the graphics card was optional, allowing the desktop publishers and designers at whom it was aimed to choose whichever third-party graphics card they preferred to work with. It seems, though, that the demand has been for complete systems. According to Apple UK, most users want systems which work straight out of the box, and even if they decide to add a third-party graphics card at a later date, they still use the ATI card to drive a second monitor. There's little to criticise in the performance of either machine. They're not cheap, but their performance will satisfy the professional users at whom they are aimed.

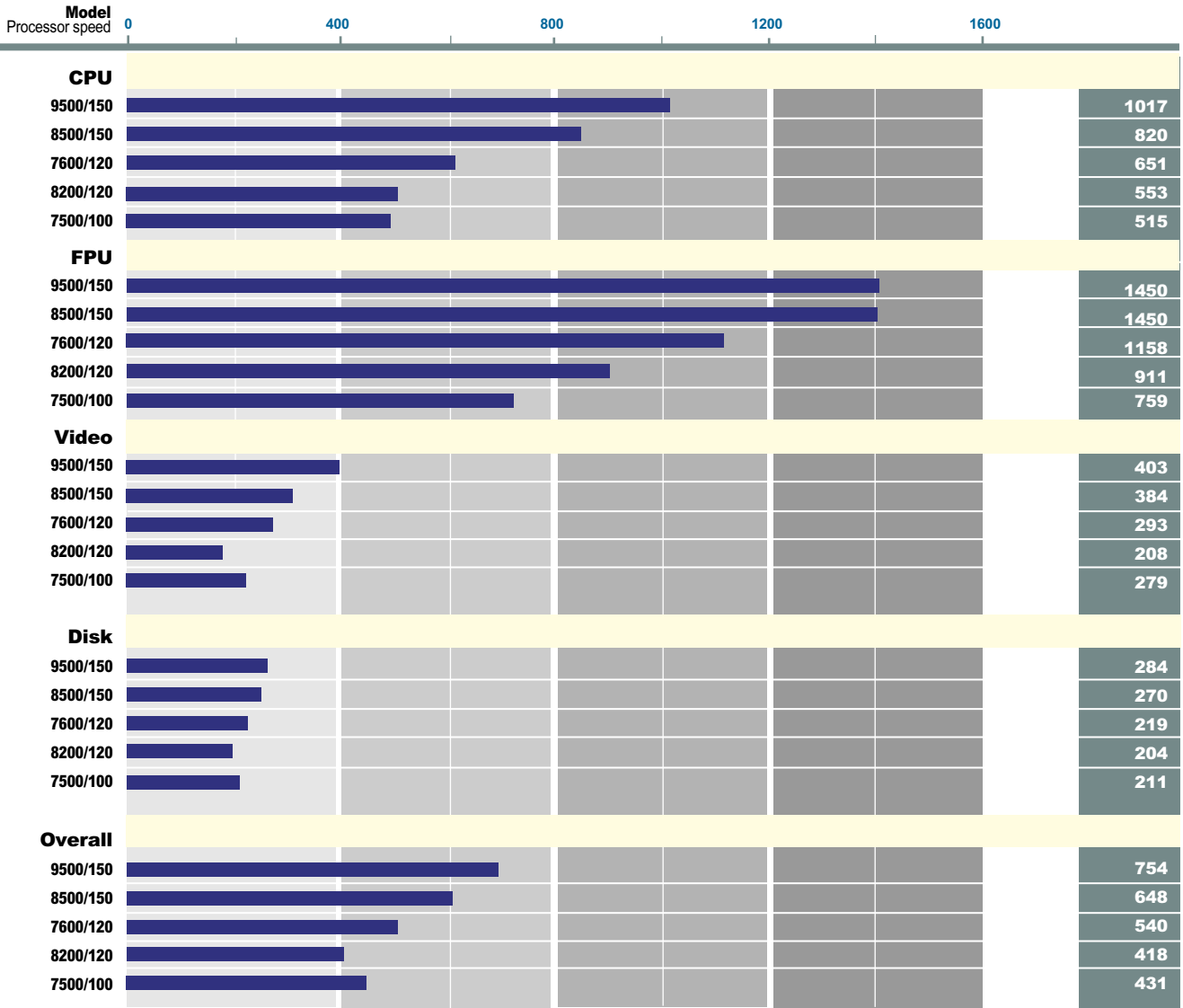
However, they do represent something of an impasse for Apple, if not quite a complete dead-end. The standard 604 processor has a clock-divider ratio of only 3:1 which means the processor can work with a motherboard that runs as low as one third of that speed. The 8500 and 9500 models' motherboards run at a maximum speed of 50MHz, which means the processors in these machines simply can't run any faster than 150MHz.

Conclusion

Until the 604e processor becomes available, or Apple comes up with a more versatile motherboard design, the Power Mac range could prove vulnerable to competition from the likes of Power Computing (see page 100.) There's no "product of the year" awards likely to be handed out to any of these machines, and the poor upgradability of the 7200 and 8200 models is a continuing weakness. However, these new Power Macs do at least show that Apple hasn't been paralysed by its recent troubles. They keep the Mac's price and performance combination moving forward at a time when 166MHz Pentium PCs are becoming commonplace, and it's particularly good to see the PowerPC 604 moving down into the mid-range 7600/120. Still, if you're waiting for Apple to, er, "kick some butt" you may have to wait for the next round of Power Macs later this year, which might even include the November debut of Apple's first PowerPC Platform machine.

Upgrade Performance

Norton index



New Mac clones from Power Computing

Power Computing has quickly established itself as the leader of the (admittedly small) band of Mac clone manufacturers, and its new PowerTower and PowerCentre machines prove that it is aggressive enough to compete with Apple in terms of both price and performance. All the new machines are based on the same motherboard as Apple's own 7200 and 8200 models. Although they represent the low end of Apple's product range, their motherboard can, ironically (and somewhat bizarrely) run at higher clock speeds than the motherboard used in the mid-range and high-end Power Macs. As a result, the two machines in Power Computing's new PowerTower range can run faster than any existing Power Macintosh. The fastest PowerTower runs at 180MHz and has a US price of \$4,195, with a less expensive 166MHz version also available for around \$3,800.

The PowerTower and PowerCentre machines weren't available for review as we went to press, so we were unable to perform any benchtesting on them. However, their clock speeds and design features suggest that both PowerTower models should be able to outperform even the top-of-the-range Power Macintosh 9500/150. But, as the motherboard used by Power Computing doesn't support memory interleaving, the performance gap may not be as wide as the difference in clock speed suggests.

Power Computing cleverly offers three mid-range PowerPC 604 machines to Apple's single product. Where Apple offers only the Power Mac 7600/120, Power Computing offers 120MHz, 132MHz and 150MHz versions of its PowerCentre machine. The PowerCentre 120 has a US price of \$1,895 which is considerably lower than that of the

Power Macintosh 7600/120. However, that price only includes 8Mb RAM, and because the PowerCentre motherboard lacks memory interleaving it is likely to be slightly slower.

Apple's Power Macs have other advantages, too, like the six PCI slots in the 9500/150, and the video input and output features of the 7600/120 and 8500/150. However, Power Computing's machines all ship with bundled software titles including ClarisWorks Nisus Writer and Now Utilities.

Technical support has been something of an issue in the US, where Power Computing is based, so those in the UK should take this into account. Power Computing has no official UK distributor (which also means that all the bundled software is sold in US versions) although its products are on sale from mail order dealer, Computer Warehouse.

● Computer Warehouse 0171 724 4104

The new-boy network

Controversy surrounds network computers, the new kids on the block.

Will they replace PCs at home and at work? Ben Tisdall brings you up to date with NC developments and tries a prototype set-top box, the Acorn NetStation.

THE CONCEPT OF NETWORK computing first hit the PC public's consciousness in November '95. Two bickering billionaires, Larry Ellison, colourful head of database giant Oracle, and Microsoft's Bill Gates, got into a slanging match over the practicality of replacing PCs with network computers (NCs).

Ellison's vision was of a cheap (\$500) device that would act as a network terminal, with the data stored on a server. By May '96 Ellison was able to demonstrate prototype NCs in action in four different formats: corporate NCs, set-top NCs (to work with a television), the portable NC (again aimed at corporates) and a telephone NC.

But controversy still rages about the viability of NCs. In the sceptics camp sit Intel and Microsoft. Both companies have huge vested interests in the failure of NCs and both can muster fairly convincing arguments against them.

Intel, for instance, has figures to show

that 80 percent of internet users access the internet at 14.4Kb/sec and argues that it's totally unrealistic to use realtime video and audio at that speed. Particularly as the new, faster, technologies set to eventually replace modems (cable modems and ISDN) are catching on more slowly than most people had expected. The cable modem market is this year set to double — to a miserable 25,000 units.

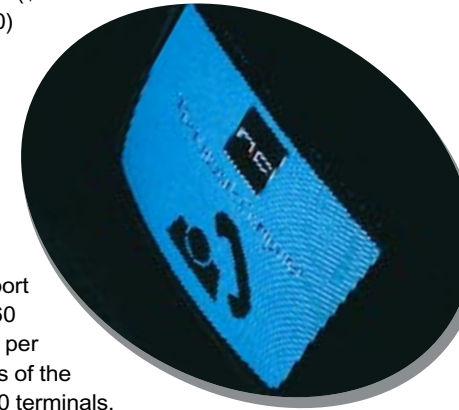
Intel reckons NCs will not replace the need for a PC. It predicts a limited market for set-top boxes like the one previewed here, but maintains that for business a true PC is a better solution, particularly as the power of PCs increases and their cost continues to fall.

Both Intel and Microsoft believe that users at home and at work will be unwilling to lose the good stuff offered by

PCs. PC uses have long taken local hard disks for granted, but new features like fast 3D graphics and high-quality sound and video are becoming more common, say Intel and Microsoft, and NCs won't be able to offer them. New Microsoft initiatives like SIPC (Simply Interactive PC) — [see Memphis preview, page 114] — are intended to answer the "ease of use" criticisms levelled at PCs.

On the other side of the fence, the NC proponents argue that most home users don't need all the features of a PC and that in business, people are fed up with the spiralling management, training, administration and support costs of PCs. For many companies NCs promise a

lower cost per seat (\$500 rather than \$1,500) and much lower running costs. A Bloor Research Group white paper on the Oracle NC cites an efficiently-run company that requires one support person for every 60 PCs, but only one per thousand for users of the more NC-like 3270 terminals.



Set-top boxes

Set-top boxes for the home face competition from PC manufacturers already targeting the home market, and from games machines by Sony, Sega and Nintendo. However, the Bloor Research Group predicts that the market for this type of device will eventually be far larger than either the games or home PC markets. Every house with a television set will be a potential customer. This perhaps explains why the first shipping NCs will be set-top boxes.

Bloor predicts that in the long run, the installed base of these devices will be pushed by telecommunication and cable TV companies. Just as cable subscribers currently rent a decoder box, consumers will be given, or will rent, a set-top NC from their service provider. The successful set-top box vendors, reckons Bloor, are likely to be the ones who can form successful alliances with cable and telecomms companies in the way that Amstrad successfully teamed up with Sky to sell satellite dishes.



TV times: the Acorn NetStation is a brilliant idea that should find a home in the living room with the telly

What is a network computer?

The Network Computer (NC) reference profile, jointly drawn up by Apple, IBM, Netscape, Oracle and Sun, provides the framework within which NCs will be designed. The intention was to keep the standards as open as possible. It also includes guidelines to content and service providers for designing and building applications and other internet content which will interoperate with profile-compliant devices. NCs that stick to the profile will "support a common Java-based programming environment enabling network-resident applications, as well as standalone applications, to execute on them".

It will not be difficult for PCs to support the NC Reference Profile. However, NCs will be designed with the network, internet and intranet in mind, from the start: the intention being to achieve a lower cost (and running costs) than PCs, and being easier to use and administer, and with security built in.

The hardware side of the profile includes a minimum screen resolution of 640 x 480, use of a pointing device, text input and audio output capabilities. The agreed internet protocols are

Transmission Control Protocol (TCP), File Transfer Protocol (FTP) and optional support for NFS (network file system). This last will enable media-less devices (like the Acorn NetStation) to store data on the network.

World Wide Web standards like HTML and HTTP are supported in addition to data formats such as JPEG, GIF, WAV and AU. There's support for the mail protocols, too: SMTP (Simple Mail Transfer Protocol), IMAP4 (Internet Message Access Protocol Version 4) and POP3 (Post Office Protocol version 3).

Last but not least is support for the Java Application Environment and Java class libraries so that NCs can run the mini-Java applets now being developed by the likes of Corel (see Newsprint, PCW August).

The profile is expected to be finalised in August and can be viewed at <http://www.nc.ihost.com>. In the autumn, the NC gang of five, Apple, IBM, Netscape, Oracle and Sun, plan to produce a web site with tests for compliance. Manufacturers that meet the spec will be able to use the NC logo.

Intranet NCs

Network computers for intranets, as opposed to consumer web-access boxes, were announced almost as soon as the NC spec was made official last June. Some had been under development before Oracle's Larry Ellison made his seminal speech last year and were given a Java interpreter to transform them into NCs.

HDS claimed to be first with its @workStation, a curious hybrid which actually uses an Intel chip: the i960 RISC processor, designed originally for embedded applications such as printer control.

In one mode it is a precise opposite to the NC, which classically downloads Java applications from the server to run locally. The HDS box can run Windows applications on the server, sending keyboard commands across the network and receiving back graphical data running locally.

In aid of a special version of NT emulators, the UK company that produces the @workStation is very close to Microsoft and Windows code.

The operating system, called netOS, is designed to refer to allow the @workStation to run minimal emulations also allow it to run applications.

The unit has 4Mb to 128Mb and there are several models, again veering from the pure PC. The base machine costs £650 with a 128Mb model in the UK. HDS's northern Europe office, in London, reckons the typical unit will cost around £1,200 with

around the \$500 envisaged by HDS. HDS says the cost of ownership is far less than a PC's because of the low cost of maintaining server-based

The NC is in the pipeline, from HDS as part of a strategy to allow users to use rate networks browser-access to a range of platforms including Windows, OS/2, and iNA-based IBM mainframes and AS400 machines.

The IDEA Internet Client Station runs on a 40MHz Intel i486 processor and will be available from late August at a price between £700 and £1,000. This unit has 1Mb of ROM, containing the Java interpreter and other core code. It has 16Mb of RAM. It has no disk drive, which is an advantage by many users. It is part of their running costs for the Java-compiled software.

...oubles as an NC and a



Acorn NetStation

The Acorn NetStation arrives in a sleek black box. It looks every inch a consumer durable and has little in common with the bulky beige boxes that continue to make up the majority of home PCs.

The whole thing is neatly packaged into a unit just over one foot wide and less than two inches deep. There are no user-serviceable parts. The unit either sits on top of a television, or just as

happily under the portable TV, as in our picture (page 105).

There's a smartcard slot at the front of the unit. It complies with the EMV (Europay/Mastercard/Visa) specification and will provide the machine's most compelling features. You will be able to "charge" a smart-card — a credit-card sized card with its own memory and embedded processor — with electronic cash downloaded straight from your bank

account simply by dialling up the internet. You will also be able to spend digital cash from the smart-card on goods and services bought across the internet.

The NetStation will also allow you to play games across the internet on your own, or potentially with thousands of opponents. At its launch, the hitch is likely to be performance: the latest 3D games don't exactly sing when running from the internet using a modem.



Acorn was the company that built the original set-top box, the BBC Micro, in 1981. This meant it already had much of the expertise required to produce such a unit. For example, it has long since solved the problems of how to make text display legibly on a TV screen.

There are two aspects to it. One is anti-aliased outline fonts which, according to Acorn founder Herman Hauser, "they (Microsoft) still don't have right with Windows 95". The second is anti-twitching, which is a technique to get rid of the characteristic flickering which is a problem with television displays.

Inside the box is a 40MHz ARM 750FE processor designed by sister company Advanced RISC Machines (ARM). The NetStation is the first machine to use this iteration of the chip, but other versions have been used in the Apple Newton and other Acorn machines.

The operating system resides on the 4Mb of ROM fitted as standard. The NCOS (Network Computer Operating System) is basically Acorn's established RiscOS augmented with an internet browser and smart-card support. Acorn has been ROMming operating systems for ten years and is quick to point out the advantages. ROM is far cheaper than RAM and removes the need for a hard disk. It will, however, be possible to upgrade the operating system using ROM cards.

Hidden away somewhere in the NetStation is the ability to do some simple word-processing and spreadsheet work, but Acorn is quite rightly playing this down because this is a consumer machine.

The main means of controlling the device will be an infra-red handset much like a TV remote control. It will have arrow keys for navigating the World Wide Web and an alphanumeric non-qwerty keypad. There will also be an optional infra-red keyboard and mouse. On our prototype, the NetStation was controlled using a conventional Acorn keyboard.

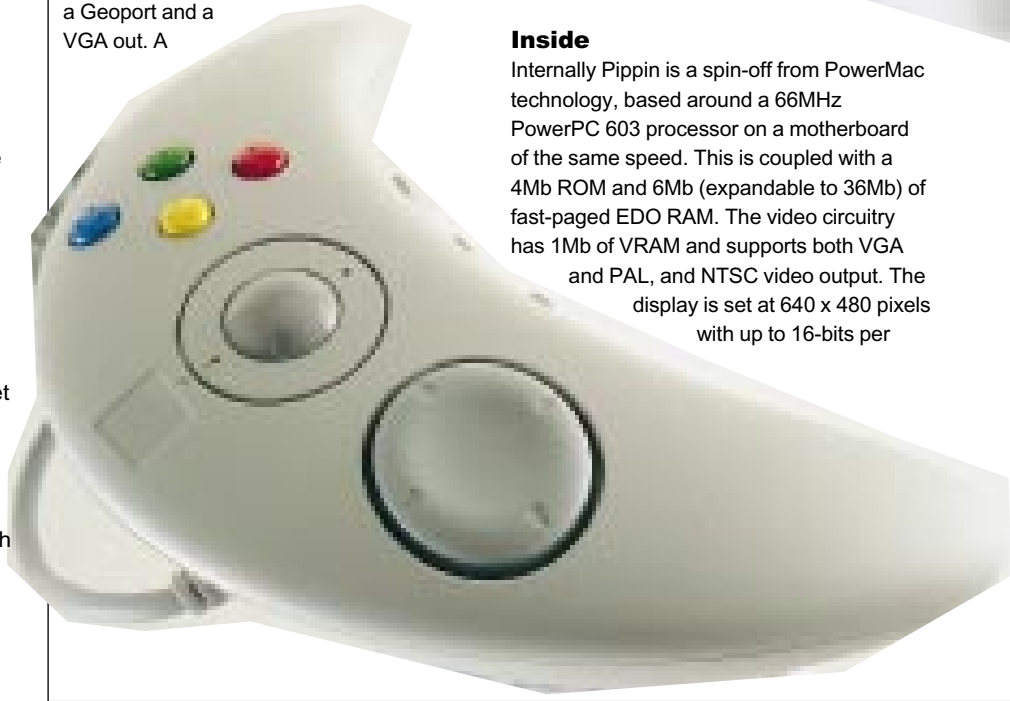
At the back of the box are ports for a printer, with a selection of printer drivers in ROM and stereo audio. You can connect the NetStation to a conventional monitor at 1,024 x 768 resolution. Connected to a television, using a SCART connector the resolution is 760 x 576 interlaced. There's an optional cable to connect the NetStation to pre-SCART TVs. The first NetStation will have a V.34 Plus modem built into it. This standard, due to be ratified in October, improves

Apple/Bandai Pippin

Not all the ideas in network computers (NCs) are new; Apple has been working on a similar idea for a while. The result is Pippin, a low-cost multimedia "appliance" designed to be as versatile as a PC but as easy to use as an audio CD player or television set. The first machines, now on sale in Japan, have been developed in conjunction with toy manufacturer Bandai, best known for its Mighty Morphin Power Rangers line of products.

Outside

At first glance, Pippin will have no problem convincing people that it's not a traditional computer. Its curvy cream casing and CD button controls give it a non-threatening look, ideal for the living room. Closer inspection reveals a horde of connectors at the rear including stereo audio outputs, a SCART socket, phonos for composite video, a Geoport and a VGA out. A



quad-speed CD-ROM drive at the front, offset by a cute Pippin logo, finishes the whole thing off.

The Japanese model comes with an AppleJack controller pad similar to those bundled with the Sony Playstation and Sega Saturn. On the left is a small, thumb-operated trackball which is easier to use than you might think, while the right has four brightly-coloured buttons rather like Smarties. Two more buttons, which simulate mouse clicks, are located underneath at the front. An optional keyboard can be connected to Pippin via a standard Apple Desktop Bus (ADB) port and this will be bundled with the US machine.

Inside

Internally Pippin is a spin-off from PowerMac technology, based around a 66MHz PowerPC 603 processor on a motherboard of the same speed. This is coupled with a 4Mb ROM and 6Mb (expandable to 36Mb) of fast-paged EDO RAM. The video circuitry has 1Mb of VRAM and supports both VGA and PAL, and NTSC video output. The display is set at 640 x 480 pixels with up to 16-bits per

slightly on V.34 with a maximum throughput of 33.6Kb/sec.

With an eye to the future there is interface support for much higher bandwidths, with ATM (Asynchronous Transfer Mode 2.048Mb/sec or 25.6Mb/sec) and Ethernet. An ISDN card is also in the pipeline.

Using the NetStation is extremely easy. Once the telephone number of the service provider has been entered, a couple of clicks will take you straight to your favourite web page. Sending email is just as straightforward: a single hotkey

brings up the email dialogue box.

On the early version of the software we looked at, support was missing for some of the newer web innovations. The browser was up to HTML 3.2 but there was no support for frames or animated GIFs. Acorn has pledged to have a Java interpreter and Shockwave extension available for download by the time the product ships — in fact, a Shockwave movie running on the NetStation has already been demonstrated.

The shipping version of the product will also support frames. However,

Apple/Bandai Pippin



Bandai's Pippin — PowerMac performance and internet access in your front room

pixel for thousands of colours.

Pippin users have to connect an external modem to the Geoport serial interface if they want to get on-line. There is, however, a single internal PCI expansion slot for other hardware add-ons such as an MPEG decoder. Apple says the configuration may change for the US and European versions.

Bandai also produces an optional stand with a 1.44Mb floppy drive for storing data. It has to be said that this would be almost completely useless for storing most of the data that people would want to keep, but if all

considering the phenomenal rate of change on the web, keeping up with the latest technologies on a proprietary browser may prove tough. Acorn assured us it wouldn't be a problem and explained that Netscape's planned portable cut-down version of the browser will also be available in time.

Conclusion

The Acorn NetStation is a brilliant idea, and already incorporates some impressive technology. If the final version of the software delivers all that's

promised, I think it will succeed. At £399 (incl. VAT) it has a sufficient price differential with a full-blown PC to give it appeal. Acorn is already talking to companies like Radio Rentals about the possibility of renting the units.

Even if its games performance is indifferent, the NetStation will fulfil Acorn's promise of "email for everyone" and provide easy access to the internet. The NetStation offers much better value for money than the first generation of PC TVs (see PCW, December '95). However, I suspect many early adopters

will have a PC, too: the PC will stay in the study while the NetStation muscles into the living room on top of the telly.

Software

Netscape is the default web browser for Pippin and Bandai has a worldwide distribution agreement. It works in the same way as the Mac and PC versions, complete with support for a Java plug-in, but the unit's limited screen resolution means a lot of scrolling around to make use of most web pages. It's also quite difficult for the average non-computing punter to get to grips with; a simpler, custom-designed browser would have been better.

Other Pippin titles shown to PCW included training and presentation discs, a couple of games which were simply conversions of Mac hits, and a rather naff Karaoke number that apparently goes down well in Japan. It is clear that those companies involved with producing software need to work on their presentation. The public expects original titles with Hollywood production values, not ports of old Mac stuff.

Conclusion

Although it doesn't follow the proposed specification for NCs to the letter, Pippin is clearly going along the right path. The fact that it sold over 15,000 units in its first week of sale in Japan, at Y64,000 (\$600), must mean something. But in its present form, it's far more like an enhanced version of Philips' CD-i or 3DO than an NC. The US and European versions, and future products based around Pippin technology, will need to be geared far more towards the internet, Java and the true nature of NCs.

Chris Cain

● Bandai Pippin with AppleJack controller: US price to be set at around \$600. Contact Katz Media for the European version of Pippin (see "PCW Contacts", below).

PCW Contacts

- Acorn 07000 852852
- Apple 0181 569 1199
- Bloor Research Group 01908 373311
- HDS 01344 382164
- IDEA 0181 390 5945. (Distributor: HAL 01734 699699)
- Insignia Solutions 01494 459426
- Katz Media (European version of Pippin) (00331) 45 20 02 97



Where next for Windows?

Memphis, Nashville... Has Bill Gates abandoned software, donned his shades and gone into the music biz? No: these codenames form the core of Microsoft's plans for Windows. One year on from the hype-heavy launch of Windows 95, Ben Tisdall and Tim Anderson catch up with developments.

Although Microsoft has so far refused to name the product, it now seems certain that it will release a new version of Windows 95 next year. The codename for the product is Memphis and it seems a reasonably safe bet that the final product will be called Windows 97, in line with the Office 97 suite already announced.

Microsoft has not released much in the way of updates to Windows 95 since its launch in August 1995. A service pack did quietly appear, and a second update has been prepared for OEMs, mainly to introduce FAT32. This is an update to the DOS file system that supports hard disks over 2Gb, and saves disk space by using smaller cluster sizes. The major update in 1997 will be driven by the need to support new hardware features. These include:

- OnNow, a technology to make PCs switch on immediately with no lengthy boot process.
- Universal Serial Bus, for improved communications and peripherals support.
- Advanced Configuration and Power management, for better power management and plug-and-play.
- DVD-ROM, an optical disk likely to replace CD-ROM and offering greater capacity with faster access.
- Win32 Driver Model, a new standard for device drivers that will work in future versions of both Windows NT and Windows 95.

Many of these are cross-industry initiatives, but Microsoft's dominance of desktop software leaves the company

well-placed to establish hardware standards as well.

Like it or not, there is good logic here in that hardware and software advances need to go hand in hand. Microsoft is working on a "PC 97" standard that embraces all the above features and will be supported by the 1997 version of Windows 95.

Most of these features will be incorporated into what Microsoft is calling the SIPC (Simply Interactive PC). SIPC is a framework rather than a full-blown reference platform, which defines easy-to-use sealed-unit PCs. Hardware manufacturers like Compaq, Hewlett-Packard, Intel and Toshiba have already endorsed it. OnNow and the Win32 Driver Model are both incorporated into the SIPC framework.

PCW Illustrations by Stephen Caplin



The aim of OnNow is to make PCs ready for use immediately the On button is pressed, just like a TV or VCR. PCs will look as if they are turned off but will still be able to respond to wake-up events like alarms set in software, or incoming faxes, or emails. OnNow also includes power management so that users will feel comfortable leaving their computers switched on.

OnNow does, however, face some formidable technical hurdles to get hardware, system BIOS, operating systems and applications to co-operate, and to achieve the kind of system robustness that will allow PCs to run for weeks or even months at a time without complete re-initialisation (or rebooting) of the software. Although OnNow will debut in consumer PCs, it is likely to migrate quite quickly to corporate networks.

Just as Win32 supplies a common API for Windows applications, the Win32 driver model (WDM) is intended to provide common I/O services and binary-compatible device drivers for Memphis and Windows NT, with plug-and-play for the new bus architectures IEEE 1394 and

USB (Universal Serial Bus) built-in from the start. The new bus architectures are intended to allow easy upgrading of SIPCs without the need to open the case.

Microsoft makes it clear that, for the time being, the much mooted merger between Windows 95 and Windows NT workstation is not going to happen. Windows 97 (Memphis) and Windows NT 5 (no official codename but much of the technology previously known as Cairo) will remain separate products, albeit with increasingly identical user interfaces. Alongside the new hardware features, Microsoft's sudden discovery of the internet, last December, will be the other factor in shaping how future versions of Windows will evolve.

Interface

The most popular web browser by far is Netscape Navigator, at the time of writing reckoned to have around 85 percent of the market. Microsoft is fighting back hard, with new versions of Internet Explorer (see our review, *PCW* August) that are slick and fast, and which support

the most important web standards like HTML frames and Java applets. It is a critical battle.

The popularity of the web proves that people find the browser concept natural and intuitive, so much so that it is likely to become the primary user interface to personal computers. Since Java is platform-independent, the combination of a sophisticated browser with Java applications presents a real threat to Windows (see our feature on network computers, page 104).

As an example, Corel has announced the development of a Java-based Integrated Office Suite, stating in the press release that "productivity applications based on Java could soon overtake Windows in volume."

Microsoft's answer is a complete revamping of the Windows interface based on browser technology and a plan to decouple the graphical user interface from the operating system. This makes sense for several reasons. The user does not need to be aware of what flavour OS they are running — they just pick the one that runs best on their hardware.

First glimpse of the Nashville-style interface



This version of Nashville still has the old-style buttons

A direct descendant of the Windows file manager, this side lets you find files on your network or on the internet

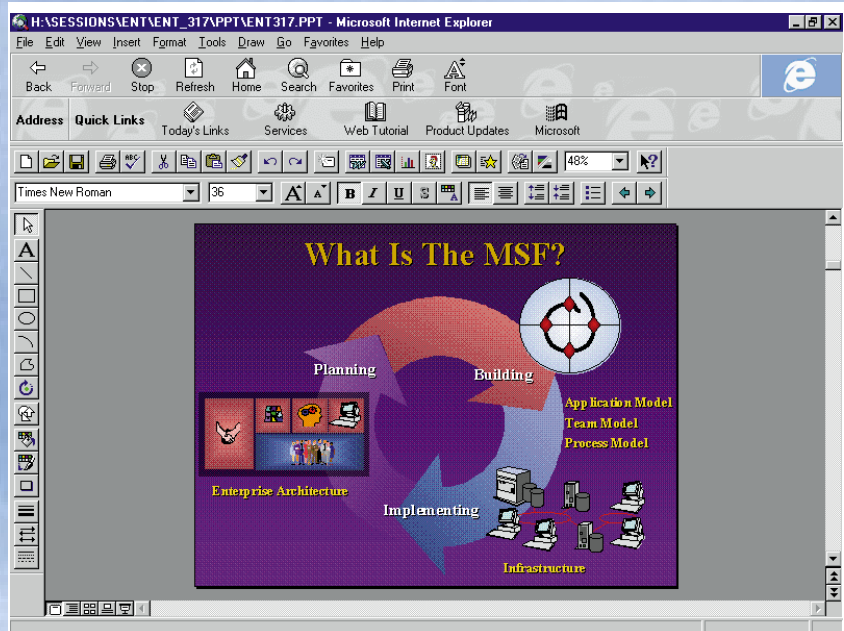
View documents or HTML pages seamlessly on this side of the screen

Windows NT

Another piece in the jigsaw is Windows NT, rapidly gaining favour as memory prices tumble and the corporate market realises that Windows 95 is a transitional product. NT 4.0 (see our review in PCW, August) adds the Windows 95 shell along with network OLE, allowing remote communication with OLE objects.

The Internet Explorer 4/Nashville update will be available simultaneously for Windows 95 and NT, and support for new hardware should appear at the same time so NT will no longer lag behind. Microsoft recently stated that from 1998, Windows will have a "common kernel" based on NT. There may still be separate versions of Windows for the home and corporate markets, but both will be addressed by Windows NT. Another implication is that 1997 will see the last major update to Windows 95.

A thought to bear in mind is that upgrading from Windows 95 to NT is currently not straightforward and requires complete reinstallation of most software. The message to both home and business users is clear: migrate to Windows NT as soon as it is feasible to avoid a painful, later, conversion.



Is this the future of Windows? This beta version of Internet Explorer 3.0 is able to host documents from other applications such as PowerPoint. In future you may be able to do all your work without leaving the browser

Additionally, GUI development is much quicker than OS development. It's easier to do, for one thing, and it has to be developed faster because of the rate at which the competition, notably Netscape, are pushing their own interface development forward. And, operating system development needs to allow the hardware guys to keep up. OnNow and SIPC depend on hardware support.

Internet Explorer 3.0 already has Active X support. In addition to allowing movies, animation and audio into HTML pages, Active X allows Doc Objects. This OLE feature allows Explorer to host documents belonging to other applications such as word processors or spreadsheets. This means that if you open a Word document within Internet Explorer, the Word button bar will be visible (see the screenshot, page 117).

Explorer 3 also has changes in the look of the interface which hint at how the Memphis/97 interface might look: for example, new-look and rather tasteful monochrome icons which turn to colour when you pass the mouse cursor over them. Strangely, the only screenshot of IE 4.0 that Microsoft has so far provided



Microsoft is pinning its hopes on Memphis and Nashville — ready to rock'n' roll in '97?

Microsoft at play

Having established Windows 95 as the mainstream PC operating system, Microsoft now wants it to be the number one platform for games and multimedia. To this end, a horde of APIs (Application Programming Interfaces) are under construction which will provide developers with the facilities needed to make things happen. Major items among the improvements are DirectX, Direct3D and ActiveMovie.

Originally promised for the first release of Windows 95, DirectX is a set of low-level drivers that allow programmers to achieve DOS games performance under Windows. The first version of DirectX comprises four elements: DirectDraw, DirectSound, DirectInput and DirectPlay.

DirectDraw is an advanced memory manager for video memory which provides programs with direct access to graphics hardware for the fastest drawing speeds, while maintaining compatibility with existing Windows 95 applications and device drivers. It actually breaks some of Microsoft's own rules on accessing video, but if developers stick to this way of breaking the rules there shouldn't be any problems. Some video-card manufacturers have already started shipping DirectDraw drivers for their products, including VideoLogic and Matrox.

In much the same way, DirectSound provides better access to the facilities on the

latest sound cards, including low latency mixing and hardware acceleration. DirectInput provides a fast and consistent way for programmers to use analogue and digital input devices such as joysticks and trackpads. It will maintain compatibility with the rules laid down in the Win32 SDK and improve responsiveness and reliability. The remaining component of DirectX is DirectPlay, designed to create standards for developing multiplayer games.

The Direct3D API is an even bigger event. Just finalised, this integrates realtime 3D graphics into the Windows environment. It includes a software rendering engine with transparent support for 3D hardware, a standard file format, the ability to map images and videos onto animated 3D objects, 2D and 3D graphic mixing and object management services. In short, it's a complete system-level architecture for using 3D, much like Apple's QuickDraw 3D.

ActiveMovie is a massive overhaul of Microsoft's digital video software. Among the listed enhancements will be full-screen MPEG playback in software on anything from a 90MHz Pentium upwards, video and audio streaming for fast playback on the internet, and tight integration with the Direct libraries.

From these developments it is clear that Microsoft has identified current Windows bottlenecks and is doing a lot to fix them. Roll on Windows 97.



Chris Cain

Windows 95 — one year on

One year ago, in our Windows 95 cover story, we quoted Brad Silverberg, the Microsoft vice president who looked after Windows 95 development: "It's clear that the hype factor for Windows 95 got out of hand. It's not a floor wax, it's not a dessert topping, it's just Windows."

Despite the hype, initial take-up of Windows 95 was slower than expected. By the beginning of January Microsoft had shipped only 20 million copies of the product, which broke down into 12 million OEM copies of the product and eight million upgrades. Since then, Microsoft has been cagey about sales, perhaps because they've been a little disappointing. Microsoft admits to being surprised by the length of corporate roll-out cycles. Despite the lengthy Windows 95 beta program, most corporates wanted to test final code before committing to roll-out.

IDC figures show that three million PCs a month are shipped worldwide. Microsoft's own figures suggest that over 70 percent of those machines ship with Windows 95. So in the six months since then, Microsoft should have shipped another 15 million copies.



Windows 95 has been better, generally, for end-users than for corporates. Paul Berry of Simply Computers said, "Corporates are undoubtedly waiting for Windows NT. Whether they'll upgrade to it is another question." Peripheral and memory manufacturers also expected a boom as people rushed to upgrade their PCs ready for Windows 95. It didn't materialise. And sales of the product are generally considered not to have met expectations. Steve Bennett of Software Warehouse said, "Volume-wise it's the number one seller, and has been since it launched, but it hasn't really met the high expectations set for it." Chris Bakolas, technical director at Dan Technology, took the same view: "It hasn't made the impact people expected."

Nevertheless, there's no denying that Microsoft has succeeded in establishing Windows 95 as the new standard on the desktop. According to Microsoft in the UK, over 80 percent of new PCs sold are now shipped with Windows 95. The entry-level standard for PCs has moved up from a 486SX two years ago, to a Pentium with 16Mb of RAM and a 1Gb hard disk: machines able to run Windows 95 at very acceptable speeds.

Windows 95 successes

- The number one selling software product through retail.
- Now shipped on most new PCs.
- Introduced plug-and-play to PCs.
- There are now 3,000 devices that conform to the plug and play standard, according to Microsoft.
- According to PC Data, eight out of ten new software products are Win32 products bearing the "designed for Win95" logo.
- Windows 95 is easier to use than Windows 3.*

Windows 95 failures

- Many corporates are waiting to evaluate NT 4.0 before committing to Win95.
- Feeling among users that Win95 has driven up the cost of an entry-level PC with its high memory, disk and processor requirements.
- "We have problems with any device that you have to open the box to install. Plug-and-play has helped but it hasn't solved the problem." — *Paul Berry, Simply Computers*.
"Plug-and-play is a nightmare. We are now seeing devices with plug-and-play which don't work. In some areas it has reduced support calls but in other areas they've gone through the roof." — *Chris Bakolas, Dan Technology*.
- "There need to be more products that are true plug-and-play. If there are 3,000 devices already I'm surprised." — *Steve Bennett, Software Warehouse*
- Less than half of currently-shipping products bear the "designed for Win95" logo.
- It's so different from Windows 3.* that migration requires training.

shows the old Win95-style button bars.

Although Explorer 3 is still in beta form, Microsoft already has Internet Explorer 4 in the pipeline. IE 4, code-named Nashville, will integrate the Internet Explorer with the Windows Explorer file manager so that you seamlessly browse your PC's hard disk and local network servers as if it were the web. If applications run inside the browser as well, it becomes the only interface software you need. Should the idea catch on, most Windows applications will need to be redesigned accordingly. As an

example, Microsoft has already announced that the familiar Windows help engine will be replaced by an HTML-based equivalent.

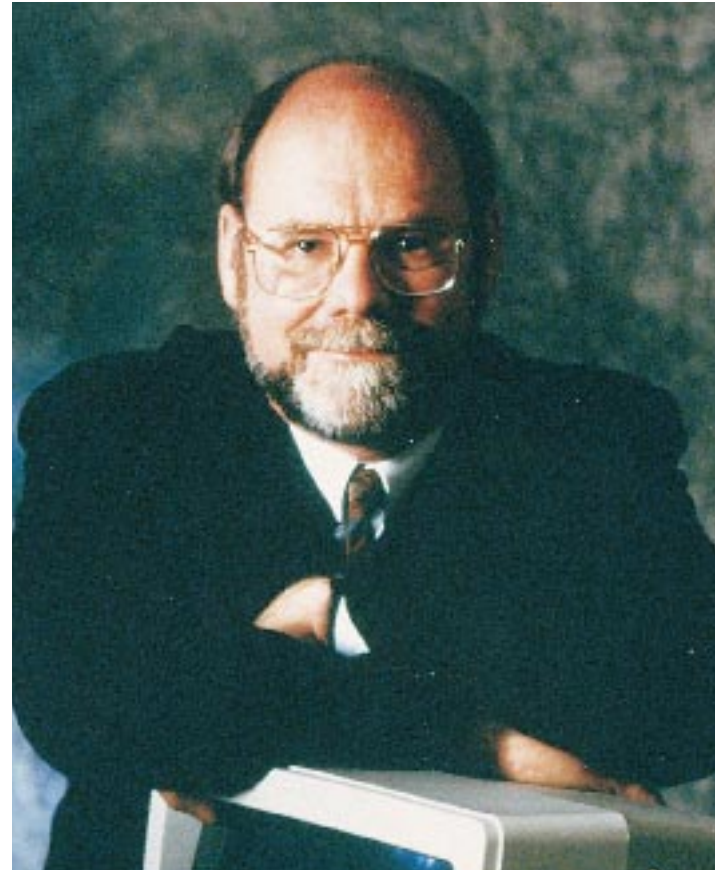
Internet Explorer 4.0 also includes features like a peer web service. This will effectively allow informal intranets to be set up on a network, so that you can browse other workstations on your local network. The product is also likely to include Pointcast's dynamic wallpaper technology. This will mean your wallpaper or screensaver can be updated with news and stock prices, say, using a

live feed from the internet. Check out <http://www.pointcast.com> to see it in action. IE 4.0 will also include personalised desktops, building on the themed desktops found in the Plus Pack for Windows 95.

Internet Explorer 4, sold as an add-on pack for Windows 95, will be very close to the universal decoupled GUI that Microsoft eventually plans for both Windows 95 and Windows NT. The product is due to go into beta in December, which points to a second quarter 1997 launch.

The story of Gary Kildall's Great Missed Opportunity has passed into folklore. But what is the truth behind this *cause célèbre*?

Gordon Eubanks, Symantec supremo, told Clive Akass.



Gary Kildall wrote CP/M, the first mainstream desktop operating system. He invented the concept of a Basic Input Output System (BIOS), the core logic which marries hardware to the operating system. He was a founding father of desktop computing, yet history mainly recalls his greatest mistake. He was the man who gave away the IT industry; the man who gave Bill Gates the world.

The story goes that two suits from IBM had arranged to meet him at home on a certain day in 1980. Kildall was off flying his plane, and had left his wife Dorothy to do the talking. She balked at signing an agreement to not disclose anything they told her, and showed them the door.

Nonplussed, the suits then approached a fledgling company called Microsoft about the small matter of developing an operating system for the first IBM PC.

Legend of the fall

Such is the legend, already enshrined in alt.folklore.computer. Only it wasn't quite like that, according to one man who was around at the time. Gordon Eubanks founded Symantec, one of the biggest software companies to have grown fat by plugging the gaps left by Microsoft. He knew Kildall from way back in the early seventies.

They were very different characters. Eubanks was drafted into the Navy during the Vietnam War, and stayed on to get sponsored for graduate school. He formed his first company while still a student and has



PCW Illustration by Nick Grant

been an aggressive, even predatory, businessman ever since.

Kildall, a specialist in compilers, was one of his tutors and a brilliant programmer, but by all accounts was out for a good and easy life. He wrote CP/M (Control Program for Microprocessors) in 1973, almost as a by-the-way, to help him develop software for the 8-bit 8080, one of Intel's first microprocessors.

Eubanks couldn't understand him. "I remember having lunch with him one day and he said to me, 'I don't know what to do with the CP/M.' So I said, 'You had better make it a business.' And he said, 'I am not sure if people will buy it.' I replied, 'Oh Gary, come on...'" It is now more than two decades later and Eubanks still shakes his head in astonishment.

Within five years of having had that conversation, hundreds of thousands of machines, using Z80 or 8080 processors, had been sold with CP/M as their operating system. Kildall had formed a company called Intergalactic Digital Research, which he later shortened to Digital Research, and became a multimillionaire.

For a time, Eubanks was in direct competition with Bill Gates, selling rival versions of Basic to run on the CP/M machines. He was still in the Navy, his mother was running his company from her home in California, and he decided it was time to get out. "Then Gary offered to buy the company at a really high price. I think he paid ten times revenue for it in Digital Research stock, which ended up

being worth a lot."

Eubanks joined Digital Research but left after two years. "It became clear to me that Digital Research did not have the will to win and they were losing opportunities. So I went off and did my own thing."

The problem was that events had been too easy on Kildall. "He felt everything was in his court, and he could do whatever he wanted. This was where Gary and I had a hard time... where we did not get on very well."

Disaster had nearly occurred some time earlier when hard disks were introduced and CP/M would only support floppies. Hardware manufacturers, tired of trying to get an upgrade out of Kildall, almost reached the point of developing a rival operating system.

"All of a sudden Gary realised that business was starting to dry up because the floppy-disk systems were not selling. People wanted hard disks and high-density disks."

Kildall finally ordered a crash program to write a CP/M upgrade. "When something like that happens... it's like when someone has a heart attack, they get a whole new view on life and start to work out... But Gary never realised how close he came to losing his business, and he did not change."

The same thing happened all over again when Kildall was slow to bring out a CP/M upgrade to run Intel's new 16-bit 8088 and 8086 chips. Tim Patterson, an 8088 boardmaker at Seattle Computer Products, got so tired of waiting that he wrote his own operating system, called QDOS. "Tim got frustrated, as did a lot of people, about Gary's attitude to this kind of thing," Eubanks recalls.

IBM had been slow, too. It was still stuck in the age where a computer filled a room and could be used to milk its owners of millions. IBM did not want to know about desktop computers and didn't want anyone else to know either.

By the end of the seventies, the microcomputer business had become too big to ignore. IBM decided it had to get in on the act. It could not afford the time to



develop its own model from scratch, so the decision was taken to build a machine from off-the-shelf hardware components and bought-in software.

Kildall's Digital Research was the obvious place to go for an operating system, hence the famous visit to the Kildall home. Eubanks says: "I've told this story to lots of people and they just won't get it. All they want to get is that IBM showed up and Gary was off flying his aeroplane. The problem is that this is very wrong."

For one thing, Kildall never dealt directly with hardware manufacturers. He left that to his wife Dorothy. "Gary was very laid-back. He didn't care that much. Dorothy ran the business and he ran the technical side and they did not get on." And who could have known that the IBM PC was going to be important? "IBM was just one of dozens of companies who were in the [microcomputer] business."

Dorothy was talking to some people from Hewlett-Packard, Digital Research's biggest customer at the time, when the

IBM representatives showed up on the doorstep. She was in the throes of preparing to go on holiday the next day. "That was what really caused the problem," says Eubanks.

That, and the contrasting characters of Gates and Kildall. "The real issue wasn't that Gary refused to talk to IBM. The real issue was that Microsoft had a much better vision for the business. Gary was very laid-back. He did not care that much. And Bill was extremely focused and driven."

Gates did not even have an operating system at that stage. After IBM called, he promptly bought Patterson's QDOS for \$50,000. It was little short of a CP/M clone, but it was to become MSDOS and run nine out of ten of the world's desktop computers.


News of the deal spread quickly. Patterson rang Eubanks, warning him to port his Basic to the new operating system. "I said, 'Jeez, Tim, why is that?' And he said, 'I can't tell you, but a big Seattle company has just licensed it, and licensed it on to a hardware company that's bigger than anyone you can think of.' I said, 'Let me get this right. You are telling me that IBM licensed it from Microsoft.' Tim said, 'I didn't say that but you should definitely support it.'"

Digital Research pioneered

pre-emptive multitasking, and its GEM graphical operating system was more successful than early versions of Windows. But the company never regained the pre-eminence it had in the seventies, and was bought by Novell in 1991. Kildall died in 1994 at the age of 52, from head injuries received during a night out in Monterey, California.

These days, Eubanks regularly pauses in London to brief journalists about the latest products from Symantec, a company he bought in 1982 from the proceeds of his early business ventures. Gates' move in buying up QDOS seems to have provided something of a model, because Symantec has grown by a series of similar strategic acquisitions, including Central Point Software, Peter Norton Computing and, most recently, Delrina.

As Eubanks puts it, "[Symantec's] strategy is to focus on businesses with good growth prospects and the opportunity to become market leader... We use acquisitions to accelerate entry into key markets."

About his early success, he says: "I was lucky. I was in the right places at the right times." His last word on Kildall is: "Gary could have owned this business if he had made the right strategic decisions." 

Eubanks on Microsoft, Java and NCs

Symantec has always remained close to Microsoft, specialising in niche applications with which the bigger company does not bother. It was there at the start of Windows 95, simultaneously launching a 32-bit utilities suite and Norton Navigator, an enhanced version of the '95 Explorer. Eubanks confesses to have been disappointed by Windows 95 sales and consequent Symantec sales, and says that if he had known 18 months ago what he knows now, he would have concentrated more on the internet and Windows NT, the preferred operating system of large corporates.

"Windows 95 is quickly becoming the dominant operating system for the home and small business. Our investment in that technology was a smart investment. We have had three straight quarters of record revenues. But we expected bigger records than we achieved." He still believed Windows 95 was a good OS. "But it is not going to be the dominant operating system in either Europe or the US. It'll be present in all companies but NT is going to be dominant. OS/2 is history."

Symantec is giving all its products net savvy, including a Live Update feature that makes fixes and upgrades continuously

available. It has just launched Symantec Café 1.2, the latest version of its Java development environment.

Eubanks is surprisingly downbeat about Java. He describes it as a well thought out attempt to reap the benefits of object-orientated programming, without the organisational problems of C++, and says the concept of the Java Virtual Machine is peculiarly suited to the

multiplatform web. But he believes the industry has a tendency to raise expectations too high. "It is a combination of the public wanting to get excited about these things, and the industry trying to get excited to rise above the noise level... We are providing very high-quality Java development tools. We believe that Java is a really important language that people will be using and adding value to. But do I think it is over-hyped? Absolutely. Do we over-hype it? Probably."

He believes the importance of the network computer has been overstated, not least because PC prices are likely to fall to the \$500-\$800 mark slated for the NC. Eubanks says: "To me, the most exciting thing is to take personal computers and integrate them to very high-bandwidth network access."



"...But do I think it [Java] is over-hyped? Absolutely. Do we overhype it? Probably."

Panel & Scan

Above
Handheld:
Mustek Twain-Scan

Below
Flatbed:
Trust Imagery 4800SP
Compact Scanner

Scanners, scanners everywhere... well, over the next 15 pages anyway, where we check out the capabilities of a range of handheld, document and flatbed models. Gordon Laing, Adele Dyer and Eleanor Turton-Hill officiate.

document management. Handheld scanners still represent the budget end of the market, and are also the ideal choice for those with little spare desk space. Flatbeds remain ultimately flexible for those wanting to do a mixture of colour, high resolution and document scanning. Best of all, prices have tumbled, particularly in the flatbed market.

Here we have your one-stop-shop for all your scanner needs. We've got four handhelds, six flatbeds and eight document scanners, costing between £75 + VAT and £400 + VAT on the street. Can't decide which variety is best for you? Then check out our application box-outs on optical character recognition (OCR) and photo retouching. Those curious to discover how scanners work will be satisfied with our technology feature. Then, turn to our results pages to see which products cut the mustard, in terms of speed, colour accuracy, and line-art resolving power.

● *Detailed advice on which scanner is best for you can be found in the Hands On Graphics & DTP column, page 290.)*

It's time for our annual group test of scanners, easily one of the most popular computer peripherals

available today. The scanner's great success is due to its enormous flexibility. At its most basic level, a scanner is used to capture images for use on a computer. These images could be photographs for retouching, correction or use in desktop publishing. They could be hand-drawn logos required for document letterheads. They could even be pages of text which suitable software could read and save as an editable text file.

The list of scanner applications is almost endless, and has resulted in products evolving to meet specialist requirements. A new breed of compact document scanner has arrived en-masse, designed exclusively for OCR and

PCW Photography by David Whyte

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Document:
Sicos DMS2000

Scanners

How they work

All scanners work on the same principle of reflection or transmission. The image is placed before the scanning head, consisting of a light source and sensor; in the case of a digital camera, the light source could be the sun or artificial lamps. The amount of light reflected by or transmitted through the image is picked up by the sensor, then converted to a voltage proportional to the light intensity — the brighter the part of the image, the more light is reflected or transmitted, resulting in a higher voltage. This voltage is finally converted by an analogue to digital converter into information the computer can understand.

The sensor used in many scanners is a charge coupled device, CCD. A CCD consists of many photo-sensitive elements, arranged in a grid in the case of a video or digital camera, or in a long, thin line in the case of desktop scanners; the more photo-sensitive elements per unit length, the higher its resolution.

A desktop scanner claiming a horizontal optical resolution of 300dpi and a maximum document width of 8 inches will have 8 x 300, that's 2400 usable elements on the CCD. The CCD itself is usually around four inches wide, so an optical system in the scanning head focuses the light down to the correct size.

The vertical resolution of a desktop scanner is dictated by the degree of fineness that the head can be physically directed over the image. In the case of a flatbed scanner, the head is driven by a stepper motor, a device which turns a predefined amount and no more, each time an electrical pulse is fed. It's common that the maximum vertical resolution may exceed the horizontal resolution, thanks to the stepper motor being highly geared; an optical resolution of 300 x 600dpi is not unusual.

The optical resolution represents the maximum resolution of the CCD and the stepper motor as described above. It is, however, possible for the apparent resolution to be increased using a technique known as interpolation, which under software or hardware control guesses intermediate values and inserts them between real ones. Some scanners do this much more effectively than others.

Colour scanners have three light sources, one for each red, green and blue

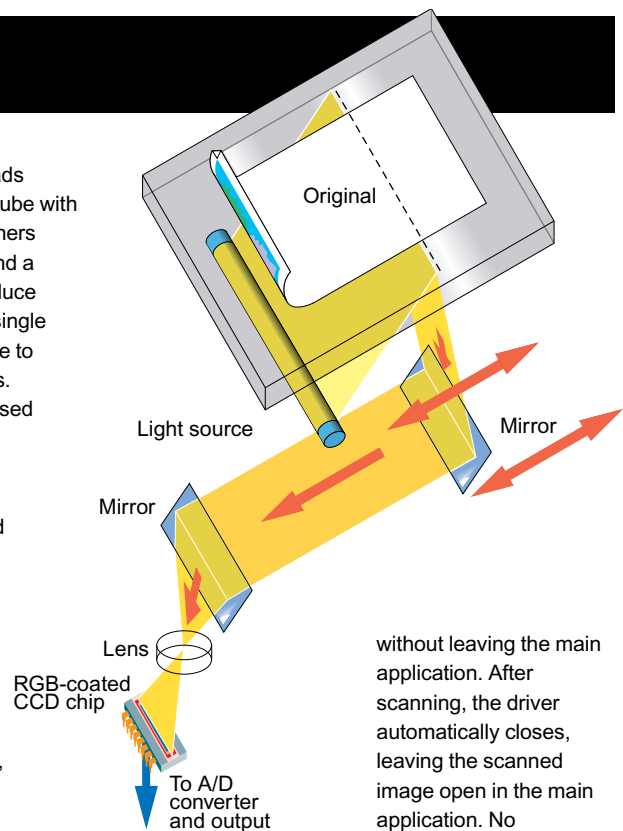
primary. Some scanning heads contain a single fluorescent tube with three filtered CCDs, while others have three coloured tubes and a single CCD. The former produce the entire colour image in a single pass, while the latter will have to go back and forth three times. Older three-pass scanners used to suffer from registration problems along with being slow, but modern three-pass units are much improved and sometimes even faster than today's more common single-passers.

The range of colours or shades captured by a scanner is down to the dynamic range of the analogue to digital converter, along with the purity of the illuminating light and any system noise. In theory, a 24-bit scanner offers an 8-bit range of 256 levels for each primary colour. The human eye is said to be incapable of discerning more than 256 grey levels, while most printers would be hard pushed to produce anywhere near that number. However, in practice, a few of the least significant bits are lost in noise, while any subsequent tonal corrections reduce the range further still. That's why it's best to make all your brightness and colour corrections in one go from the scanner driver before making the final scan itself.

All flatbed and handheld scanners in this group test were provided with TWAIN-compliant drivers for Windows, and some with faster TWAIN 32 drivers specifically for use with Windows 95 or Win32s extensions.

Surprisingly, TWAIN is not an acronym, neither is a TWAIN driver someone who gets you to work in the morning. TWAIN is however a very important standard in image acquisition, developed by Hewlett-Packard, Kodak, Aldus, Logitech and Caere. With TWAIN, only one driver file is required for each device. Developers need only make their applications TWAIN compliant and they'll be able to access and control any TWAIN devices.

In practice, you would select the "acquire" option in the File menu of an application such as Photoshop. The user would be prompted to select a suitable TWAIN source which would launch the device's own driver, all




without leaving the main application. After scanning, the driver automatically closes, leaving the scanned image open in the main application. No unnecessary quitting,

launching, or saving of potentially large and possibly useless files.

Not all TWAIN drivers are the same. It is up to the device manufacturer to write a driver and decide what options it should offer. All flatbed scanner drivers offer a preview which quickly displays a small representation of the image to be digitised. From here, the scanning area may be adjusted along with the resolution and pixel depth.

Better TWAIN drivers offer a high degree of overall image adjustment such as brightness, contrast and colour. In addition, several offer Gamma correction. This allows adjustments to be made to specific ranges of tonal values, either as a whole, or to each primary colour in turn.

Monochrome line art is either black or white and therefore requires only 1 bit per pixel: on or off, black or white. An 8-bit greyscale image is 8 times larger than a 1-bit image at the same resolution. A so-called full colour, 24-bit file is 24 times larger than a 1-bit file at the same resolution. Line art is best scanned at very high resolutions, while most colour or greyscale images are fine scanned between 100 and 200 dots per printed inch. Remember that if your original is going to appear twice as big in print, double your scanning resolution; while if it's going to be reproduced at half the size in print, halve the scanning resolution. 

Scanners

OCR (OPTICAL CHARACTER RECOGNITION)

When a page of text is scanned in to your PC, it is stored as an electronic file made up of tiny dots, or pixels; it is not seen by the computer as text, but rather, as a "picture of text". In order to turn the group of pixels into editable words, the image must go through a complex process known as Optical Character Recognition (OCR).

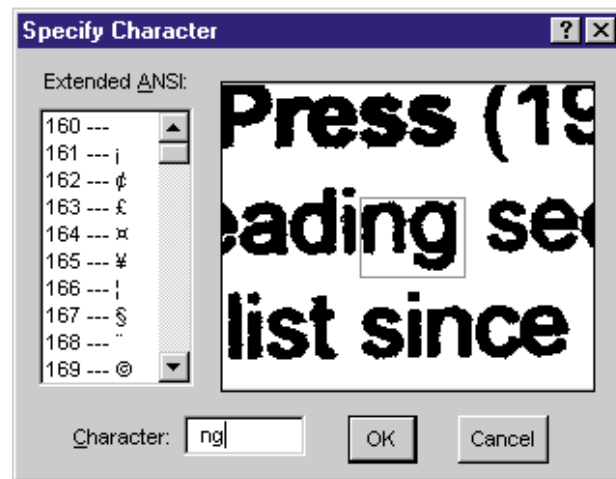
OCR research began in the late fifties, and since then, the technology has been continually developed and refined. In the seventies and early eighties, OCR software was still very limited — it could only work with certain typefaces and sizes. These days, OCR software is far more intelligent, and can recognise practically all typefaces as well as severely degraded document images.

One of the earliest OCR techniques was something called "matrix matching". This was a primitive process in which scanned shapes were compared against a database of letters until a match was found. This early system was only really successful using non-proportional fonts like Courier where letters are spaced regularly and are easier to identify. Complex multi-font documents were well beyond its scope.

Feature extraction was the next step in OCR's development. This attempted to recognise characters by identifying their universal features, the goal being to make OCR typeface-independent. If all characters could be identified using rules defining the way that loops and lines join each other, then individual letters could be identified regardless of their typeface. In terms of research progress, feature extraction was a step forward from matrix matching, but actual results were badly affected by poor-quality print. Extra marks on the page, or stains in the paper (otherwise known as "noise"), had a dramatic effect on accuracy.

The elimination of "noise" became a whole research area in itself, attempting to determine which bits of print were not part of individual letters. Once noise can be identified, the reliable character fragments can then be reconstructed into the most likely letter shapes.

Recent OCR technology is far more sophisticated than these early techniques. Instead of just trying to identify individual characters, modern techniques are able to identify whole words. This technology developed by Caere is called Predictive

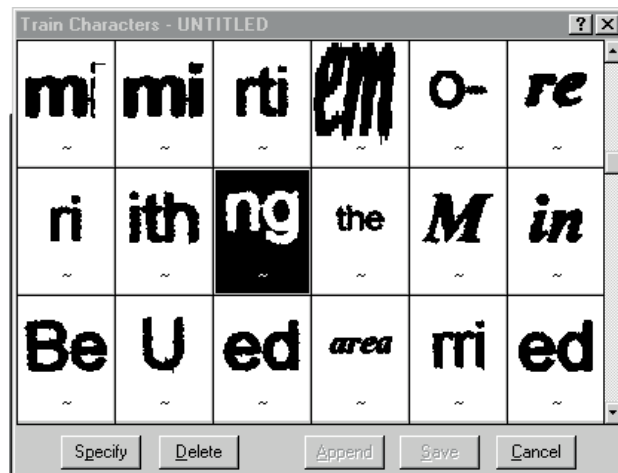


The OCR process in action. Here's OmniPage Pro 7 [reviewed in last month's First Impressions] trying to recognise tricky combinations of letters

Optical Word Recognition. Using higher levels of contextual analysis, POWR is able to virtually eliminate the problems caused by noise. It enables the computer to sift through the thousands or millions of different ways that dots in a word can be assembled into characters. Each possible interpretation is then assigned a probability, and the highest one is selected. POWR uses sophisticated mathematical algorithms which allow the computer to hone in on the best interpretation without examining each possible version individually.

When probabilities are assigned to individual words, all kinds of contextual information and evidence is taken into account. The technology makes use of neural networks and predictive modelling techniques taken from research in AI and Cognitive Science. This enables POWR to identify words in a way which more closely resembles human visual recognition. In practice, the technique significantly improves the accuracy of word recognition across all document types. All the possible interpretations of a word are assessed by combining all sources of evidence, from low-level pixel-based information to high-level contextual clues. The most probable interpretation is then selected.

Although OCR systems have been around for a long time, their benefits are only



just being appreciated. The first offerings were extremely costly, in terms of software and hardware, and they were inaccurate and difficult to use. Consequently, many of the early adopters became frustrated with the technology.

Over the past few years OCR has been completely transformed, and for the first time it looks set to be adopted in all kinds of work environments on a mass scale. Modern OCR software is highly accurate, easy to use and affordable. Also, the average PC is reasonably well endowed with RAM, which enhances OCR performance; and, as you can see from this group test, scanner prices have dropped massively. Most scanners included here come with some form of bundled OCR software, but even the fully-featured OCR programs are now cheap enough to find a market for themselves among home users and small businesses. Caere's new version of OmniPage Pro, for example, is available to anyone with an existing Caere product for £129.

Scanners

Photo-retouching

While scanners are a great way to capture colour images, that's often just the beginning. Once you have digitised a photograph, you can let your creative talents run wild by using a bitmap editor or paint package to alter its appearance.

In advertising and publishing, very few images are used "raw" — models' features are "cleaned up", wrinkles ironed out, eyes sharpened and coloured, and untidy hair trimmed. There's also a trend towards producing attention-grabbing images by distorting and montaging elements of photographs. Recent examples you might have seen include United Airlines' stretched mini, and Pepsi's famous colour-change ads featuring, among other things, blue strawberries and blue tomato ketchup.

Most of this kind of work is produced using Adobe PhotoShop, but even the simplest paint packages will allow you to open up a scanned picture and make these kinds of alterations. In this very issue we have a group test of the latest Windows paint packages, starting on page 160. While you can achieve a lot with the cheaper packages like PaintShop Pro and PC Paintbrush, packages like PhotoShop, Xres and Corel PhotoPaint make complicated effects much easier to achieve.

Like most things, becoming an adept photo-retoucher requires practice, but having powerful tools at your disposal and knowing how to use them will get you a long way. Generally, you're trying to do one of two things — change some elements of a picture in a natural way that cannot be detected (changing the colour of someone's eyes, for example) or produce something unreal and impossible-looking. Either way, the hand of the retoucher must be invisible, and if you develop skill at hiding the evidence of your tampering it will pay off in the quality of your final images.

A lot of retouching involves adding something to a picture and trying to make it look as if it was always there. If you are cutting and pasting, it's best to use your package's path tools and make selection commands to get accurate cut-outs, and anti-aliasing and defringing when pasting to remove giveaway contrasting edges.



Plane speaking: the plane in picture A and the background in picture B were adjusted in Photoshop to give the final result

Familiarise yourself with the options for adding to and subtracting from selections, and experiment with the feathering option to see how it affects your selected area.

Advanced selection techniques like using selection masks can be used, not only to cut and paste but, more usually, as a template through which to apply filter effects and other image adjustments.

Where you need to create picture detail from scratch, try using the rubber stamp or clone tool to duplicate detail from another part of the image. Again, it's largely a question of experimenting to see what works best: every subject is different. If there's no existing detail to copy from and you need to fill areas with flat colour, applying a little gaussian noise (a common image filter) will give the area some depth and make the fill less obvious. You can also make use of opacity and blend options, if your software supports them, to achieve a more natural effect. You often get a better result by applying a watered-down effect several times rather than going for it in one big hit.

Once you have pasted a foreign element into a picture, you nearly always have to adjust the colour balance to make it fit in with the original. It's not necessary to understand colour theory to know how to do this; just experiment with the sliders, curves, or whatever your particular package uses, until you get the required result. If your package does offer a curves option, though, this is the most flexible way of making colour adjustments. More and more packages now provide a variations palette which shows you the results of adding or subtracting varying quantities of red, green and blue or CMYK, depending on which colour model you are working with.

The pictures on this page show just what can be done with a little time. We like the plane in picture A and the sky and background from picture B. Photoshop's cutting, pasting and masking tools were used through six stages to replace one plane with another, to get the desired result.

Ken MacMahon

● (For more advice on photo-retouching, see the *Paint Packages* group test, page 160.)

LOGITECH SCANMAN COLOUR PRO

This Logitech hand scanner is very much like the Mustek in design: small, simple, no frills. It comes with a 16-bit interface card and is easy to set up. The resolution of a scan is set using a switch on the side of the scanner which gives you a range of 1 - 4 (100 - 400dpi). When you alter the switch, the resolution setting changes on-screen.



Hand scanners are never really easy to use, especially at high dpi levels, and this one does not go overboard to make your life easier. Dragging the device in a straight line proved difficult despite built-in rollers which are supposed to hold the scanner in place. Unlike the Mustek, this scanner has its speed indicator built into the software, which doesn't help when scanning at high resolutions as it's virtually impossible to concentrate adequately on the scanning process while looking at the screen.

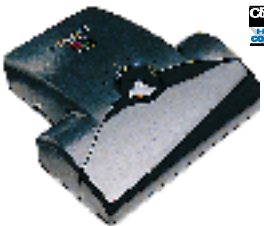
On the plus side, this scanner has an enhanced software resolution of 800dpi for colour images, which produced excellent results in our tests. Also unlike the Mustek, there is no warm-up time before scanning, so there's no need to wait around.

PCW Details

Good Points TWAIN 32 compliant. Good-quality results.
Bad Points Not the easiest hand scanner to use.
Conclusion Overpriced.
Price £113 + VAT (street)
Contact Logitech 01344 894301

MUSTEK TWAIN-SCAN

This handheld scanner connects to your PC via a 16-bit expansion card complete with old-fashioned DIP switches. It's pretty easy to configure, but if the sight of your PC's innards sends you into a cold sweat, you're probably better off with a parallel port connector. The Mustek is available with either interface but the latter is almost double the price.



There are no frills about this scanner. It's a plain black handheld device with just two controls — a dial on the side for adjusting brightness and a button on the top for starting a scan. The driver incorporates a testing program which ensures correct hardware configuration before installing.

The start button on the top of the scanner activates a red LED light when you begin your scan, but it also acts as a speed indicator by blinking when you move the scanner too fast — a useful gauge, especially when using the higher dpi levels (the maximum optical dpi level is 400).

The bundled scanning and image editing software is IPhotoPlus, a re-labelled version of Finishing Touch. TWAIN 32 drivers are available with this scanner, so it's compatible with your Win95 apps.

PCW Details

Good Points Simple design. Easy to use. Nice price.
Bad Points Bundled software could be better.
Conclusion Complete bargain.
Price £74.99 + VAT (£124.99 + VAT for the parallel interface)
Contact Evesham Micros 01386 765500

PRIMAX COLOUR MOBILE DIRECT

One of the most difficult things about using a hand scanner is maintaining steady movement as you drag the scanner over the image. This gets increasingly difficult at high resolutions where any faltering will drastically affect the final result. Primax has come up with a simple solution, in the form of a small motor attached to the back of the scanner. The Color Mobile Direct, one of a range of Primax scanners, produces results up to 400dpi resolution. Setting it up is simple as it talks to your PC via the parallel port — the connector is designed with a port replicator so that you can keep another device like a printer attached to the system.



Despite its neat design, using this scanner was not completely stress-free. At first, it refused to calibrate correctly and produced an epidemic of strange lines up and down scanned images. Calibration finally worked in "manual" mode, and results were much improved. The bundled software package, Finishing Touch, proved highly unstable under Windows 95 and crashed several times, but luckily this scanner is TWAIN compliant so it's compatible with most image editing software.

PCW Details

Good Points Great design — the motor makes scanning much easier.
Bad Points Bundled software is flaky. Calibration doesn't work in "automatic" mode.
Conclusion Works fine once you understand its foibles. Reasonably priced.
Price £127.66 (+ VAT)
Contact Primax 01235 559922

PRIMAX PHOTO ORGANISER

This piece of gadgetry is marketed as "the all in one photo lab" and uses the same basic device used by its sibling, the Color Mobile Direct. Instead of being driven by a motor, this scanner is mounted onto a sheet feeder which sucks in your pictures at one end and sends them out at the other.



Again, the Photo Organiser is connected to your PC by the parallel port which explains its higher than expected price; but if you can't afford the full £300 for a flatbed, this scanner is a respectable alternative.

When it comes to ease of use, this one is head and shoulders above the others in this round-up. Just plug it into the parallel port, install the Photo Organiser software, and it's ready to go. The speed of the scan changes according to the dpi level set in software, and images are drawn in smoothly. Photo Organiser provides basic software facilities for scanning and editing images, as well as photo album software which stores your pictures in a database and provides search facilities. Scanned results at high dpi levels were excellent, as the sheet feeder enforces slow and consistent movement.

PCW Details

Good Points Excellent design. Great results. Useful software bundle.
Bad Points None worth mentioning.
Conclusion Good all-round deal. Reasonably priced.
Price £127.99 (+ VAT)
Contact Primax 01235 559922

HEWLETT-PACKARD SCANJET 4S

The ScanJet 4s and the Visioneer PaperPort have more in common than just looks. Hewlett-Packard has licensed the PaperPort software from Visioneer, but has bundled it with its own scanner. The bundled software is a great advantage of this scanner. The software automatically detects applications, although the range is not as great as for the Visioneer. The software is a cut-down version, featuring neither the filing facility nor the business card package. However, your printer, fax, word processor and applications such as Paint are still found and put on the button bar. You can drag and drop scans onto the WP icon and they will OCR automatically.



The hardware is from HP itself and is good quality. When we tested this scanner in the March issue, it was slow, but these teething problems have been sorted out and it now runs well.

The accuracy rate was very good until more problematic formats were encountered. A coloured background bothered all the scanners, but in this one it completely ignored anything with the slightest colour behind it and made a dreadful job of the newspaper article.

PCW Details

Good Points Accurate. Bundled with PaperPort software.
Bad Points Finds newspaper articles problematic.
Conclusion A cheaper Visioneer replacement.
Price £225 + VAT RRP, £165 street
Contact Hewlett-Packard 0990 474747

LOGITECH PAGESCAN COLOUR

The PageScan Colour is still the only small document scanner to do colour scanning, but it has one more unique feature — it can be removed from its base and used to scan bound pages. It uses its own motor to pull itself over the page, and even stops before it falls off the end of a document.



When we tested the PageScan in the March issue, we had problems installing it. This time, with new drivers, installation was straightforward. However, when scanning in for OCR, no mode worked except the one for documents with a tinted background; but the results that scans made under this setting were as accurate as on other scanners. To scan the newspaper article, however, took at least half an hour of fiddling around to find the right settings.

Scan times were slow. The enhancement and preparation of the scanned document took some time before it could be OCR'd. However, when scanning in colour, it is impressive. With a maximum resolution of 200dpi it can come up with good scans, if not quite on a par with those you could expect from a flatbed scanner.

PCW Details

Good Points Versatile: scans colour and bound documents.
Bad Point Can be tricky to set up.
Conclusion Suffers by aping the flatbed it is not.
Price £299 + VAT RRP, £270 street
Contact Logitech 01344 894301

MICROTEK PAGEWIZ

The PageWiz was one of only three scanners in the test to come with a document feeder. The paper sensor still launches the software and scans as soon as it detects a piece of paper, but you do not have to sit and feed it in a sheet at a time.



The software looks and feels similar to the PaperPort package. There is a desktop on which files can be dragged and dropped onto the filing, OCR, printer and fax buttons. It does not have quite the same number of functions as the PaperPort. Applications are not automatically detected, for example, so you have to save OCR'd documents via a dialogue box. This means you have to launch your word processor to finish editing, but does save time if you want to go back to it later. The filing application is one of the most instinctive we have seen and the OCR package, a cut-down version of Caere's OmniPage, is also good.

The accuracy rate was good on all the documents we scanned and the PageWiz was quite fast. It still lacks refinement, but for £99 you can't expect everything.

PCW Details

Good Points Sheet-feeder. Easy to use.
Bad Points Applications not automatically linked.
Conclusion Cheap and cheerful.
Price £99 + VAT
Contact Eurotech 01734 810011

PLUSTEK PAGE READER

The Plustek is one of the smaller breed of document scanner. There are two varieties — the 800 connects via an interface card, while the 801 is a parallel port version. It operates with TWAIN drivers and installation of the 800 went without hitches.



The software is different from the desktop-like interfaces favoured by many manufacturers. Instead, there is a menu bar of buttons to control the software. On installation, the software will detect any relevant hardware, such as a printer, and you can assign applications, such as word processors, to other buttons or use them as pointers to storage locations.

You can set the controls to automatically deal with the scan. So, when the scanner detects paper and begins to scan, it will either send the scan to a folder, or will OCR it and then open it in Word, depending on the choices you have made.

The PageReader's results were confusingly patchy. It did very badly on the faxes and the document with a tinted background. But on the newspaper article, it produced the best results of all the scanners tested, bringing up only 11 mistakes.

PCW Details

Good Points Easy to set up. Adaptable interface.
Bad Points Patchy results.
Conclusion Good value overall.
Price £99 + VAT
Contact Solution Point 0345 400300

PRIMAX PAPER EASE

Primax has quite a share in the scanner market, especially in hand scanners, so we expected great things of this. First impressions were not good, however.

There was an option to install TWAIN drivers in the setup procedure, but no drivers were included. Instead, it uses ISIS drivers. As most of the other scanners come with TWAIN, this was disappointing.

The installation process was supposed to find several applications — ccMail, Microsoft Word and Write — and link them to the desktop and the OCR function. In fact, it only detected Write, and while you can add other applications, you cannot link them to the OCR.

Scans are displayed as thumbnails on the desktop, but these appeared as black squares, which is not very useful. There is an option to view each document in close-up, but you cannot recognise documents without exporting them to an application.

The results showed the PaperEase to be quite slow compared to many of the other scanners, and its accuracy was not much better. You were left feeling that too much effort had been put into presentation and not enough into functionality.



PCW Details

Good Points Looks pretty.
Bad Points Behaves badly.
Conclusion You can get a better deal elsewhere.
Price £149.99 inc. VAT RRP
Contact Primax UK 01235 559922

SICOS DMS2000

The Sicos has one advantage — its price. With an estimated street price of around £99, it beats the opposition hands down on price. What comes as a pleasant surprise, however, is that it behave so well. Installation is via an interface, but there were no problems installing it.

The software is not up to the same standard as the PaperPort, but is much better than some of the other offerings. The scanner is controlled from a central panel, designed to be used by a network as well as individuals. You can set it to recognise your own WP package, and to OCR and enter the scan directly into it. You can make choices for the scanner to do whatever you want with the document as soon as you feed it into the scanner. So, if you want to file it in a certain place it will do that, or send it to the fax, or to the printer.

The end results were pleasing, with one of the lowest serious error rates and good speeds. Interestingly, it was the one that made the least mistakes on the newspaper article.



PCW Details

Good Points Very cheap. Good results.
Bad Points Setting up the software requires thought.
Conclusion A real bargain. Pleasant to use.
Price £130 + VAT RRP, £99 street
Contact Sicos 00 353 1 456 9383

UMAX PAGE OFFICE

Umax is well known for its flatbed scanners and has a reputation for offering good-quality models at low prices. The PageOffice was one of the first document scanners to market, and reflects Umax's photographic-scanning pedigree.

It was the only one to come with a SCSI-2 interface card. Of all the document scanners, the Umax offers the best rendering of photographs and has the best image manipulation package, PageImage, despite being only a greyscale scanner.

The bundled software package is again like a desktop and your printer, fax and email functions are all detected, as well as Write. You can assign any other applications to the buttons at the bottom of the screen, and drag a scan directly into the package concerned. The OCR takes place automatically if you drag it to your word processor. Unfortunately, like many of the OCR packages in this test, it does not maintain the original formatting.

Scan times were variable, depending on the complexity of the document, but simple letters were as fast to process as on other machines. Its strength, however, is its adaptability, being as good at photographs as at text.



PCW Details

Good Points Excellent scanning quality. Good image manipulation.
Bad Points Slow on more complex documents.
Conclusion A great all-rounder.
Price £399 + VAT RRP, £249 street
Contact IMC 01344 872800

VISIONEER PAPERPORT

The Visioneer PaperPort seems to be used by everyone as the standard by which to judge other document scanners. None of the rest manage to demonstrate the same class or the same levels of refinement.

You can connect your PaperPort via SCSI, parallel or serial port, but we tested the serial port version. The scans themselves when produced are of a high quality. The maximum optical resolution is 400dpi — much higher than that offered by most of the opposition.

The software detects all applications that can work with it (the current list of compatible applications stands at over 100) as well as with your fax, printer and email. Documents can be imported as well as exported to make faxing easier. Filing is a simple matter of dragging and dropping onto folders on the desktop. Scans can be marked up and annotated.

The speed of scanning is good — less than 30 seconds for all the documents we tried, including the newspaper article. The only let-down is the OCR package: OmniPage Lite is not quite as accurate as the cut-down version of TextBridge used by other manufacturers.



PCW Details

Good Points Too many to mention.
Bad Points None.
Conclusion The best of the bunch. Editor's Choice.
Price £250 + VAT RRP
Contact Computers Unlimited 0181 358 5857

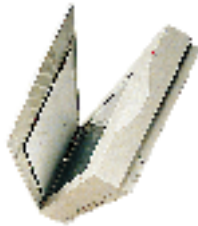


EPSON GT-500

Epson's GT-5000 ties with the Mustek and the rebadged Trust as the smallest flatbeds in this group test. The GT-5000 measures a mere 443 x 297 x 87mm and comes with an Adaptec 1510 SCSI card, but there are sadly no automatic document feeder or transparency adaptor options. It's a single-pass 24-bit scanner, with 300 x 600 optical resolution which can be interpolated up to 2400dpi.

Epson bundles full Corel PhotoPaint 5 for image editing and retouching, TextBridge OCR and Xerox Colour Document Management Suite, which includes Visual Recall Personal Edition, to look after your document needs. Curiously, the ageing CorelDraw 4 is also included. Both Corel packages are currently shipping on version 6. Epson's TWAIN driver is good, but not up to the sophistication of Umax's.

The GT-5000 is not the quickest, but is no slouch either, taking a swift 10 seconds to make an A4 colour preview, and 25 seconds for an A5 colour scan at 100dpi. Line-art resolving power was average, but the raw colour result is the best out of all the scanners tested here, just slightly outperforming the Umax S6E.



PCW Details

Good Points Compact. Quality.

Bad Points Few options, and pricey.

Conclusion Good unit, bettered only by Umax.

Price £350 + VAT (street)
Contact Epson 0800 220546

HEWLETT-PACKARD SCANJET 4P

HP's entry-level flatbed is huge: measuring 580 x 365 x 110mm, it will occupy a large portion of your precious desktop. On the plus side, it boasts the largest scanning area too: 216 x 356mm, compared to the typical 216 x 297mm.

The 4P is a single-pass 24-bit device, with an optical resolution of 300 x 600dpi, interpolatable to 1200 x 1200dpi. HP bundles an 8-bit NCR SCSI card, and offers an optional automatic document feeder at £415 + VAT; no transparency adaptor, though.

Where the 4P really scores is ease of use. The software driver is designed to totally guide the novice user, and hide the nasty technicalities. It's perfect for beginners who only know they want to scan for photo retouching or OCR work, although this could over-patronise expert users. HP also supplies Corel PhotoPaint 5 Select, and the excellent document management software originally designed for the Visioneer PaperPort document scanner.

Colour previews arrive in 15 seconds, the A5 colour photo at 100dpi took 22 seconds. Quality of colour scans was average, while line art was below average.



PCW Details

Good Points Extremely easy to use.
Bad Points Pricey, and could infuriate experts.

Conclusion Perfect for novice users.

Price £369 + VAT (street)
Contact Hewlett Packard 0990 474747

MICROTEK SCANMAKER E3

Microtek's ScanMaker E3 is a medium-sized, but quite chunky and slightly old-fashioned looking, flatbed scanner. It's a single-pass 24-bit device, with a 300 x 600dpi optical resolution which can be interpolated to 2400 x 2400dpi. Using this setting produced good line-art results. Colours with auto-exposure and adjustment activated are good, if a little over-enthusiastic.

The E3 was similar in speed to the relatively slow Trust and Mustek flatbeds, although a huge improvement over older Microtek scanners. A colour preview arrived in 22 seconds, the 100dpi 5 x 7in colour scan took 35 seconds, while an A4 page in mono at 150dpi took 19 seconds.

Bundled software consists of OmniPage LE for OCR, ImageStar for basic retouching, and an excellent TWAIN driver with a wealth of facilities. The E3 also comes with good documentation and an Adaptec 1502E 16 bit ISA SCSI card; no internal connector, though.

Other options include Photoshop LE at £40, full Photoshop 3 or Xres 2 for £150, a transparency adaptor for £299, and an automatic document feeder for £475.



PCW Details

Good Points Quality bundle, options, and cheap.

Bad Points Not the best quality.

Conclusion Could carry a bargain street price.

Price £279 + VAT (RRP)
Contact Computers Unlimited 0181 358 5857

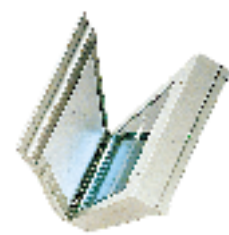
MUSTEK PARAGON 600 IISP

Mustek's Paragon 600 II SP is a tiny flatbed scanner, measuring only 407 x 286 x 95mm. It won't take over your desktop and features an attractive curvy lid. An optional transparency adaptor and automatic document feeder are available.

SP stands for single-pass scanning, which the 600 does in 24-bit, with an optical resolution of 300 x 600dpi, interpolatable to a high 4800 x 4800dpi. Unfortunately, the line-art resolving power of this scanner is not as good as the numbers suggest. A slightly better but still poor result is possible by scanning in greyscale, then converting to black and white.

As with all Mustek scanners we have tested in the past, the 600 would not work with our Adaptec SCSI card, instead only talking to the supplied 8-bit ISA SCSI card. Software consists of TextBridge OCR, Image Pals Go!, and basic but good TWAIN drivers for Windows 3.x and TWAIN 32 for Windows 95.

The 600 was one of the slowest flatbeds tested here, taking 20 seconds for a colour preview, 35 seconds for the 5 x 7in 100dpi scan, and 22 seconds for A4 150dpi mono. Colour is good though, and the price is cheap.



PCW Details

Good Points Small, cheap.

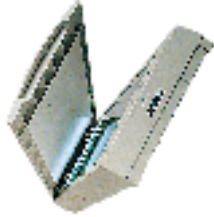
Bad Points Poor line-art result.

Conclusion For buyers on a tight budget.

Price £239 +VAT (street)
Contact Evesham Micros 01386 765500

TRUST IMAGERY 4800SP COMPACT

Trust's Imagery 4800SP Compact is a rebadged Mustek Paragon II SP, with a more conventional-looking lid and a slightly different software bundle. The image retoucher remains the average Image Pals Go! from Ulead, but the OCR is Wordlinx. No TWAIN 32 driver though; just plain TWAIN.



Being the same scanner, it's a single-pass 24-bit flatbed with a 300 x 600dpi optical resolution, interpolatable to 4800 x 4800. Once again, the line-art result is poor, although colour scans are okay.

Like the Mustek, the Trust wouldn't talk to our Adaptec SCSI card, so we used the supplied 8-bit ISA SCSI card, again the same as the Mustek offering. Being the same scanner has some advantages — it's a very small unit, measuring 407 x 286 x 95mm.

The 4800SP was one of the slowest flatbeds tested here, taking 20 seconds for a colour preview, 35 seconds for the 5 x 7in 100dpi scan, and 22 seconds for the A4 150dpi mono. Trust quoted a relatively high RRP of £349 + VAT, which still suggests it will be more expensive on the street than the virtually identical Mustek.

PCW Details

Good Points Small.
Bad Points Poor line-art result.
Conclusion Identical Mustek available cheaper.
Price £349 + VAT (RRP)
Contact Aashima Distribution
 UK 01376 500770

UMAX VISTA S6E

Umax has a great reputation for its scanners, winning awards left, right and centre. The Vista S6E is no different, boasting the best all-round facilities and quality of any flatbed tested here.



It's a single-pass 24-bit scanner, with an optical resolution of 300 x 600dpi, interpolatable up to 4800dpi: judging by its excellent line-art result, these claims are justified. The quality of raw colour scans is also very good.

Umax bundles a rebadged Adaptec 1502T, and offers an optional automatic document feeder or transparency adaptor for £495 + VAT RRP. Umax also offers a Pro version of the S6E, which comes with the transparency adaptor and a full copy of Photoshop 3 for £1145 RRP, or around £699 on the street.

Software consists of Adobe Photoshop 3.0.4 LE and Presto, an OCR and document management package. The TWAIN driver is superb, offering a wealth of features for experts, or simple one-click automatic options for beginners.

It's the quickest too, taking a speedy 10 seconds for a colour preview, or 17 seconds to make the A5 colour scan at 100dpi. A clear overall winner.

PCW Details

Good Points Great software and quality.
Bad Points Not the best-looking case.
Conclusion Has the overall edge.
Price £299 (street)
Contact IMC 01344 872800

We scanned the same 6-point letter g using each flatbed scanner at its highest quoted interpolated resolution. Notice how some obviously resolve line art better than others

EPSON GT5000



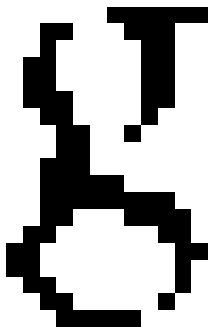
HEWLETT-PACKARD 4P



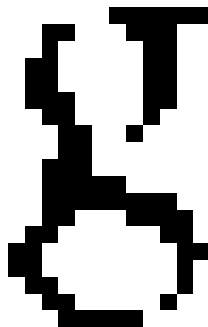
MICROTEK SCANMAKER E3



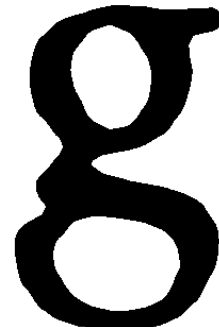
MUSTEK PARAGON 600SPII



TRUST IMAGERY 4800SP



UMAX S6E



Scanners

Editor's Choice

Personal
Computer
World
**EDITOR'S
CHOICE**

Handheld scanners

Over the past couple of years there have been a few minor improvements to the handheld scanner design, but the basic model is still the same. Resolution capability has been enhanced using complex software algorithms, and the delay caused by warm-up time has been eliminated from most models. Otherwise, there have been virtually no great design innovations.

The two hand scanners from Primax are the first I've seen which incorporate some degree of automation into the traditional design, and the Photo Organiser gets Editor's Choice in this small round-up. This model is undoubtedly the more successful of the two Primax products. With the basic unit mounted on a sheet feeder, control is completely taken away from the user, and this enables smooth and consistent results at high dpi levels.

Runner-up in this small group goes to the Mustek TWAIN scanner which gets a Highly Commended award. There are a few small differences between the Mustek and the Logitech scanner. The Logitech does not require any warm-up time, and the Mustek has a better speed indicator which is built into the hardware. The most glaring difference between the two products is the price, and at just £74.99, the Mustek wins hands down.

Primax
Photo
Organiser



Flatbed scanners

All the flatbed scanners reviewed here are available on the street for less than £370, while the cheapest costs only £240. There are clear winners in terms of speed, quality and the supplied bundle,



Umax
Vista
S6E

but an important point to make is that most are up to the same quality offered only a couple of years ago for little less than £1,000. While several flatbed manufacturers currently offer models at the £1,000 mark or even above, all are trying to get in on the entry-level market. Expect to see budget models from Canon, Sharp and Agfa in the very near future.

In the meantime, it's the established and well-known manufacturers who are unsurprisingly turning out the best models. Hindered only by its huge size, Hewlett-Packard's 4P is a great flatbed, with software ideal for the novice user, guiding you clearly through every step. Beginners should not look elsewhere.

Rock bottom budget buyers may be interested in Mustek's offering, which may not be up to the others in terms of quality, but makes up for it in price and compact size. Users wanting better quality from a compact unit should check out the Epson GT-5000.

Our Highly Commended award goes to Microtek for its ScanMaker E3, which scored well overall and is available very cheaply with an RRP of only £279 + VAT. Computers Unlimited's software options are also very tempting.

The overall winner of the flatbeds once again comes from Umax. The S6E, which also came recommended in a short round-up in PCW July 1996, wins Editor's Choice here, beating all-comers in every possible regard. The quality, particularly in resolving power, is head and shoulders above the competition. It's the quickest too, and comes supplied with excellent software. The price for this unrivalled package? £299 + VAT on the street. A clear winner.

Document scanners

This is the second time in the last six months that we have looked at document scanners, and since then, most of them have all improved, benefiting from new drivers, and some have dropped their price. There are a couple of new offerings and these have come in at the lowest price points.

One of these, the Sicos DMS2000, receives the first of our Highly Commended awards. It has a street price of only £99, good functionality, is easy to use and produces good results. In short, it is everything a document scanner should be.

The next Highly Commended goes to the HP ScanJet 4S. It plays the country cousin to Visioneer's sophisticated townie, but as our results showed, it is fast and accurate and, of course, is bundled with the basic bits of the PaperPort software. It is also a cheaper option. So, if you are only interested in good value, functionality and performance, this could be answer.

Finally, Editor's Choice once more goes to the Visioneer PaperPort. Not only does it have all the functionality you could ever dream of, but its simplicity itself to use. And, as our tests showed, it is also the fastest and most accurate scanner on the market.



Visioneer
PaperPort

Editor's Choice

- Primax Photo Organiser
- Umax S6E
- Visioneer Paperprt

Highly Commended

- Mustek TWAIN scanner
- Microtek ScanMaker E3
- Sicos DMS2000
- HP ScanJet 4S

Scanners

How we did the tests



All tests were performed under Windows 95. Flatbeds and handhelds were tested on a Pentium

90 with 16Mb RAM, and document scanners on a Pentium 150 with 16Mb RAM.

Handheld scanners

When it comes to testing handheld scanners, ease of use is the overriding factor. Each one included here has been put through its paces with a selection of test material, from simple line-art drawings to highly complex photographic images. Although many handheld scanners now claim 800dpi capability, this figure is actually achieved using software interpolation: the real optical resolution is usually 400dpi, although at this setting the user has to drag the handheld scanner excruciatingly slowly over the image.

Each hand scanner was tested at its highest optical dpi level — a demanding test both for the scanner and for the user. The quality of scanned results were then assessed on a variety of factors including colour accuracy, contrast, brightness, and effectiveness of software-enhanced resolutions. We scanned an A5 colour photo with each handheld at 100dpi, using any automatic software settings, and print them here alongside the colour flatbeds for comparison [page 148].

Flatbed scanners

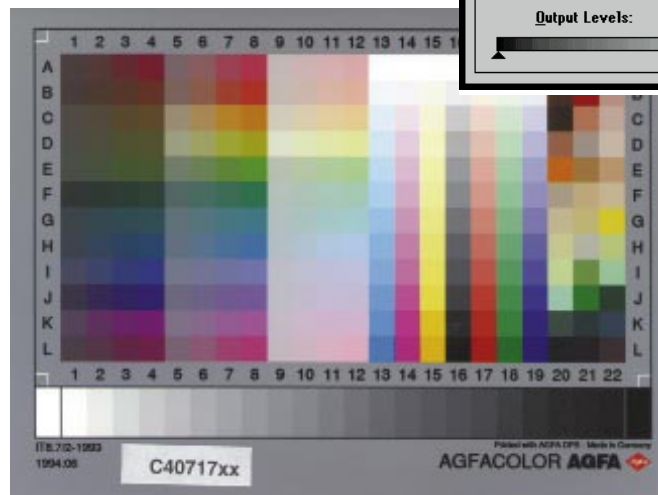
Flatbed scanners are the most versatile devices in this group test, and will typically be used for OCR, high-resolution line-art work, and high-quality colour photographic scanning. All models tested were SCSI devices connected to an Adaptec 2940 PCI SCSI controller card. Only the Mustek and the rebadged Trust complained and had to be used with the supplied 8-bit SCSI cards.

We scanned the same A5 colour print used to test the handhelds, at 100dpi, with any automatic correction settings available from the software driver. These are printed alongside each other as an indication of

how good a raw scan without manual intervention can be. We have also printed the original photograph, scanned using our high-end drum scanner, as the ultimate comparison.

Resolving power was tested by scanning a tiny 6-point letter g at the highest interpolated resolution of each unit. Enlarging these and placing them side by side shows clearly that one 300dpi flatbed is not the same as another.

We also timed how long it took for each flatbed to make an A4 colour preview, scan the A5 photo in 24-bit colour at 100dpi, and scan an A4 page in mono at 150dpi. These results are quoted in the reviews.

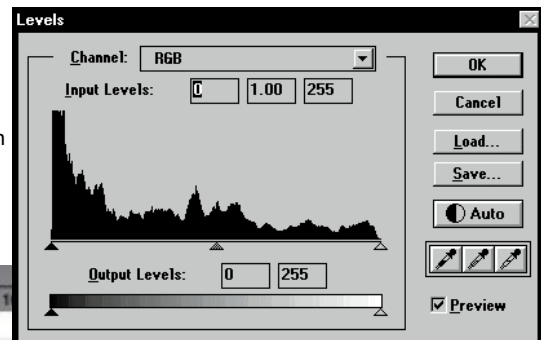


This patchwork of coloured squares is none other than Agfa's IT-8 test target. It consists of particularly tricky combination of colours and shades, which many scanners have a hard time capturing. To see how the scanner has performed, open the image in a package which offers a histogram facility, such as Photoshop; a histogram shows the range of colours and shades present in an image. What you're looking for from the IT-8 scan is a complete range of values from one end to the other, without any gaps. The histogram pictured here is for a high-end Agfa Arcus II scanner with a complete gapless range, which translates into high performance even after any corrections. We tested each colour flatbed scanner with the IT-8 target to see what range of colours had been captured

Document scanners

In testing the document scanners we were looking primarily for ease of use. None of these scanners should be hard to set up and run. The focus instead should be on giving good, fast results with the minimum of fuss.

We scanned five different documents: a plain letter in 12-pt Arial; two faxes, one plain



and the other with complex formatting; a newspaper article, cut from the Financial Times, with a coloured background, a photograph, a caption and a wide variety of different type sizes and styles; and finally, a product release, printed on thick, glossy paper with a large illustration, a tinted background and text arranged in a crescent moon shape. Many of the document scanners performed poorly on these tests. The last

two were the real problem ones, especially the newspaper article.

For the speed test we counted the time it took for a document to be scanned, recognised and opened as a file in Word. The lower the final figure, the faster the process.

Looking at the results, we compared not only the number of errors, but the type of errors: that is, whether one character was wrong, or if the entire word was garbled. To calculate the final score we gave each finished document a mark out of ten, taking into account the number and type of errors. The average was then worked out for each scanner. The higher the figure, the better the scan. The number of errors is probably the more important factor, as this determines the time it will take you to edit the document.

The final results are printed as bars on page 150.

EPSON GT5000



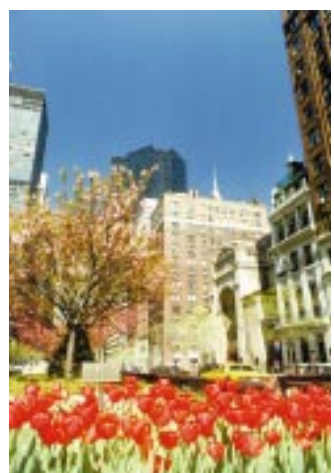
HEWLETT-PACKARD 4P



LOGITECH COLOUR PRO



MICROTEK SCANMAKER E3



MUSTEK PARAGON 600



MUSTEK TWAIN-SCAN



PRIMAX COLOR MOBILE



PRIMAX PHOTO ORGANISER



TRUST IMAGERY 4800SP



UMAX S6E



REFERENCE IMAGE



We scanned the same A5 colour print on all the handheld and flatbed scanners using any automatic exposure settings. Compare them with the reference scan, left, made with the high-end drum scanner at our repro house.

HANDHELD SCANNERS TABLE OF FEATURES

Manufacturer Model	Logitech ScanMan Colour Pro	Mustek Twain Scan	Primax Photo Organiser	Primax ColorMobile Direct
Contact	Logitech	Evesham Micros	Primax	Primax
Tel	01344 894302	01386 765500	01235 559922	01235 559922
Fax	01344 894303	01386 765354	01235 536375	01235 536375
Street price	£113	£74.99	£127.99	£117.99
Type of connection				
Interface card	●	●	○	○
Parallel port	○	Optional	●	●
OCR Software	OmniPage Direct	Recognita GO-CR		ReadIris
Photo retouching software	ColorDesk Photo	iPhotoPlus *	Photo Organiser	Finishing Touch*
Sheet feeder	○	○	●	○
Colour scanning	●	●	●	●
Max. opt. resolution (dpi)	400	400	400	400
Warm-up time	○	●	○	○
Twain32 compliant	●	●	●	●
Type of speed indicator	Software	Hardware	N/A	Software

KEY ● Yes ○ No * iPhotoPlus and Finishing Touch are the same software package, just re-labelled

FLATBED SCANNERS TABLE OF FEATURES

Manufacturer Model	Epson GT-5000	Hewlett-Packard ScanJet 4P	Microtek ScanMaker E3	Mustek Paragon 600 SPII	Trust Imagery 4800 SP	Umax Vista S6E
Optical resolution	300 x 600dpi	300 x 600dpi	300 x 600dpi	300 x 600dpi	300 x 600dpi	300 x 600 dpi
Interpolated resolution	2400 x 2400dpi	1200 x 1200dpi	2400 x 2400dpi	4800 x 4800dpi	4800 x 4800dpi	4800 x 4800 dpi
Colour	24-bit	24-bit	24-bit	24-bit	24-bit	24 bit
Passes	single	single	single	single	single	single
Maximum scanning area	216 x 297mm	216 x 356mm	216 x 297mm	216 x 297mm	216 x 297mm	216 x 297mm
Retouching software	PhotoPaint 5	PhotoPaint 5 Select	ImageStar	Image Pals Go!	Image Pals Go!	Photoshop 3.0.4 LE
OCR software	TextBridge	Visioneer	OmniPage LE	TextBridge	Wordlinx	Presto
Supplied SCSI card	Adaptec 1510	8-bit NCR	Adaptec 1502E	8-bit	8-bit	Adaptec 1502T
ADF option	○	●	●	●	●	●
Transparency option	○	○	●	●	●	●
Dimensions (whd)	443 x 297 x 87mm	580 x 365 x 110mm	505 x 338 x 115mm	407 x 286 x 95mm	407 x 286 x 95mm	526 x 336 x 131mm
RRP	n/a	n/a	£279+VAT	n/a	£349+VAT	n/a
Street price	£350+VAT	£369+VAT	n/a	£239+VAT	n/a	£299+VAT
Supplier	Epson	Hewlett Packard	Computers Unlimited	Evesham Micros	Aashima Distribution	IMC
Telephone	0800 220546	0990 474747	0181 358 5857	01386 765500	01376 500770	01344 872800

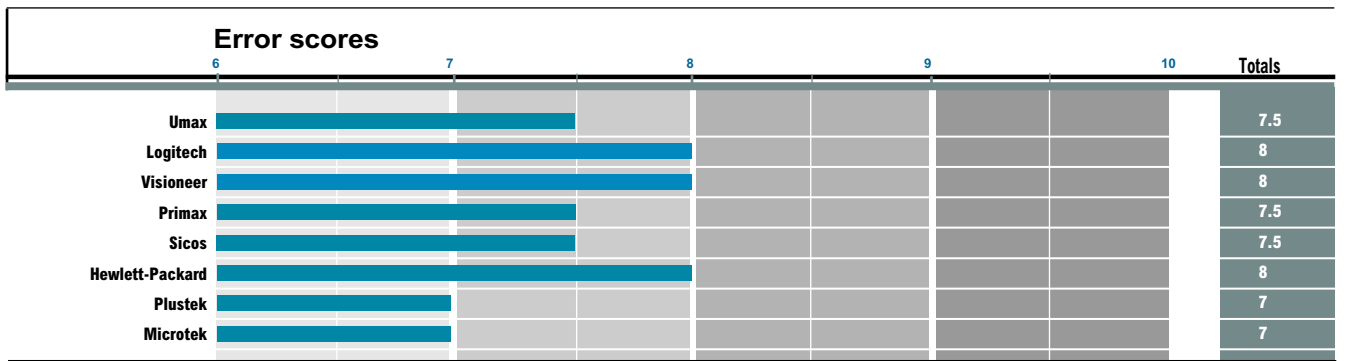
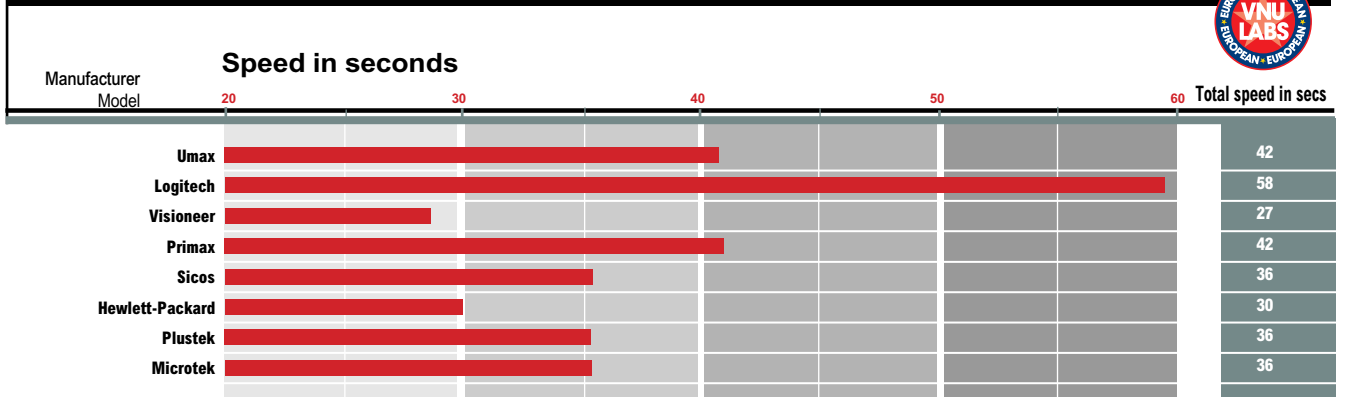
KEY ● Yes ○ No

DOCUMENT SCANNERS TABLE OF FEATURES

Manufacturer	HP	Logitech	Microtek	Plustek	Primax	Sicos	Umax	Visioneer
Model	ScanJet 4S	PageScan Colour	PageWiz	PageReader 800	PaperEase	DMS2000	PageOffice	Paperport Vx
Contact	Hewlett Packard	Logitech	Eurotech	Solution Point	Primax UK	Sicos	IMC	Computers Unlimited
Tel	0990 474747	01344 894301	01734 810011	0345 400300	01235 559922	00 353 1 456 9383	01344 872800	0181 358 5857
Fax	0171 735 5565	01344 894303	01734 810110	0181 296 7140	01235 536375	00 353 1 450 1696	01344 872868	0181 200 3788
RRP	£225	£299	£99	£99	£149.99 inc VAT	£130	£399	£250
Street Price	£165	£270	£99	£99		£99	£249	
Connection								
Interface card				●		●	●	
Parallel port		●	●	● (£109)	●			●
Serial port	●							●
Bundled software								
OCR	OmniPage Lite	TextBridge	OmniPage Ltd Ed.	Recognita Plus	Textbridge	Recognita Plus	Presto	OmniPage LITE
Filing	PaperMaster HP	PaperMaster SE	Integral	Scan and Save	None	Scan and Save	Presto	Integral
Photo retouching	None	PageScan Image	Integral	iPhotoPlus	None	iPhotoPlus	Presto	None
Links to applications								
Automatic	●	●	○	○	○	○	○	○
Manual	●	●	○	●	○	○	○	○
Features								
Dimensions (w x h x d)	32 x 9 x 7(cm)	21 x 7 x 9.2	28 x 11 x 5.6	29 x 8.5 x 6.5	32.2 x 9 x 6.6	31.2 x 6.9 x 6.1	32 x 13 x 12.5	32 x 9 x 7
Weight (lbs)	2	8.7	2.2	1.7	1lb 10oz	2lb 2oz	5	2
Sheet feeder	○	○	●	○	●	○	●	○
Autosaving	●	●	●	○	○	○	○	●
Auto fax /printer detec.	●	●	●	●	●	●	●	●
Colour scanning	○	●	○	○	○	○	○	○
Max. optical res.	20 dpi	200dpi - colour, 400dpi - mono	300dpi	200dpi	600dpi	200dpi	300dpi	400dpi

KEY ● Yes ○ No

DOCUMENT SCANNERS Performance Results





When I'm painting Windows

Ken McMahon reviews a broad palette of ten leading Windows paint packages and sorts out the smooth from the lumpy.

WHEN PEOPLE TALK about graphics, whether they know it or not, they generally mean one of two things: Vector graphics illustrations created by applications like Adobe Illustrator, Freehand, and Corel Draw; or photographic images.

Paint packages which allow you to scan in, manipulate, and save or print out photographic images are what this feature is all about. The tools such packages provide can also be used to create original images from scratch. Some applications specialise in providing "natural art tools" which emulate the look of oils, chalks, water-colours and so on. Some even allow you to go beyond what's normally possible with conventional media.

The practice of photo manipulation has been in the news

a lot lately. It's packages like Adobe PhotoShop, Corel Photo-Paint and PaintShop Pro that allow unscrupulous picture editors to make John Prescott look like he is quaffing champagne. On a more mundane level, there probably isn't one magazine cover model who hasn't undergone a minor face lift, or a single holiday beach that hasn't had a few bathers removed, or a muddy river that hasn't been made to, seemingly, run blue.

Leaving aside the ethical implication of such digital skulduggery, photo image editors can be used to create quite stunning special effects and composite images that wouldn't have been possible using conventional photographic methods.

In a digital picture each pixel is assigned a value which

determines how it appears on the screen or printed page. A 24-bit RGB colour image is actually three 8-bit greyscale images combined. Each pixel is represented by an 8-bit value for each of the red, green and blue channels giving 2,563, or more than 16 million possible colours.

Most bitmap editors work directly at the pixel level (the exception is Xres) changing the value of selected pixels in the image and hence its appearance. To lighten a colour image, for example, all the pixel values might be increased by a specific amount. Most editing packages worth their salt provide powerful selection tools which allow you to select pixels on the basis of proximity to a particular

Leading lights: from left to right — Fractal Design Dabbler 2, Adobe PhotoDeluxe, PhotoFinish, PaintShop Pro, Adobe Photoshop

- 162 Adobe PhotoDeluxe 1.0 (Beta)
- 163 Adobe Photoshop 3
- 166 Corel PhotoPaint 6
- 168 Fractal Design Dabbler 2
- 171 Fractal Design Painter 4
- 173 JASC PaintShop Pro
- 174 Macromedia Xres2
- 175 Micrografx Picture Publisher 5
- 176 Softkey PC Paintbrush
- 181 Softkey Photofinish 3
- 183 Case Study — A Designer's View
- 183 Pointers on Plug-ins
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- 186 Table of Features

colour, as well as a wide selection of filters which can enhance image quality and produce special effects.

Another must for serious compositional work is the ability to superimpose layers of detail without destroying underlying data and the ability to create transparent merge effects. Edits are generally destructive; you usually get one chance to undo, then that's it. Layers overcome this drawback as well as providing merge options which determine how the detail in the upper and lower layers interact to produce the final result.

Throughout the coming pages, we review and rate nine of the leading Windows paint packages. Who will take the covered Editors Choice? Read on.

Adobe PhotoDeluxe 1.0 (beta)

PhotoDeluxe 1.0 is Adobe's all new photo editing package aimed at the home market. Expecting a cut down version of PhotoShop, we were pleasantly surprised when we got our hands on a late beta version for inclusion in this roundup.

PhotoDeluxe has been designed from the ground up, to appeal to those who have little or no knowledge of image editing. Coming from the developers of the industry standard used by professionals it has all the power you'd expect or need. It has been packaged in a superbly designed interface which makes all its features instantly accessible.

All the PhotoDeluxe toolbars are implemented in the tabbed card design, accompanied by large buttons and easy-to-recognise icons. Things are so well-ordered and laid out and that you don't really need a user guide: the interface guides you through the kinds of projects you are likely to want to undertake.

Projects range across three headings, or buttons: Touch-up Photo, Transform photo, and Cards and More. Each of these houses a collection of projects. The transform option includes things such as changing backgrounds, putting someone else's head on a body, and useful things like creating a web page.

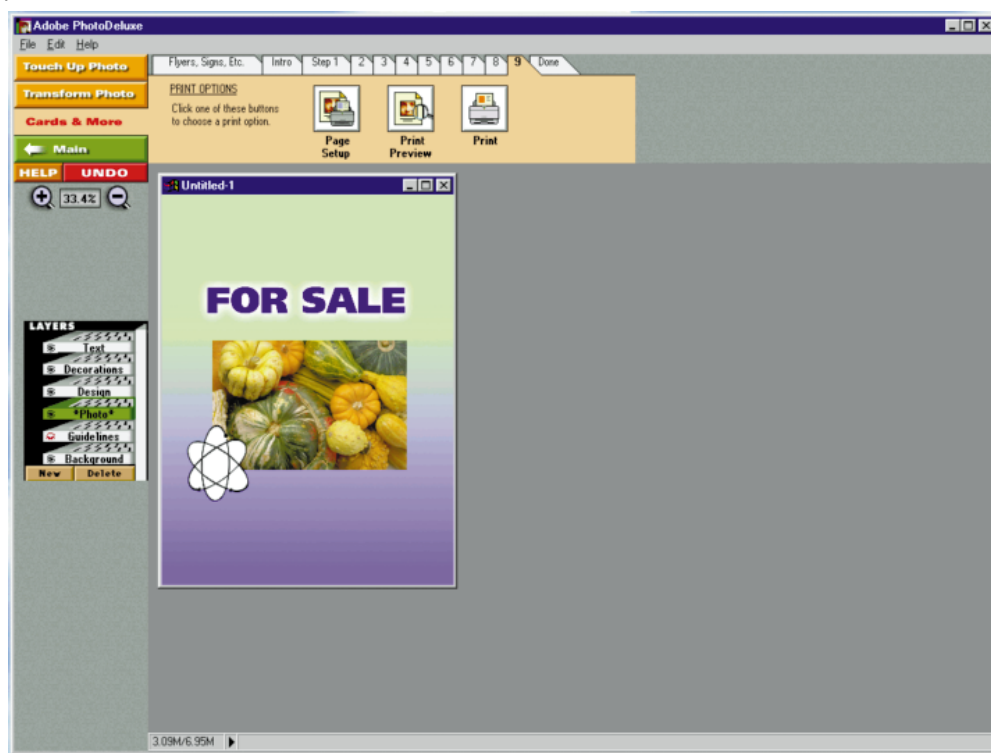
When you select a project, a series of tab cards takes you through the process in a step-by-step fashion from opening the source image through to saving the final document. Step-by-step guides are nothing new but the way in which PhotoDeluxe presents the information is just incredibly well done. Too often, important information is taken for granted or the presentation is so poor it's easy to overlook. PhotoDeluxe leaves nothing out and the design is easy on the eye as well as being highly functional.

The problem with leading users by the hand is that they quickly become proficient at the basic and want to try



contains buttons for colour balancing, brightness and contrast adjustment, hue and saturation adjustment, sharpen and dust scratch. These are either simple one-touch affairs (as with the sharpen button) or for colour balance, for instance, a simple dialogue box with sliders is displayed.

The PhotoDeluxe CD contains lots of extra goodies including a special edition



PhotoDeluxe: ideal for fun with photos at home

something more sophisticated. For those who want to try something outside the scope of the guides, PhotoDeluxe has a "work on your own mode" which allows you to do your own thing, working on an image using tools and filters in the conventional fashion. The tabbed panels are still there, serving as good-looking tool ribbons.

The modify card, which is where most of the action happens, contains button cards for editing, basic tools, orientation, size, quality and effects. The quality card

of After Dark, a trial version of Damar Interactive's Better Photography, a small subset of the KPT special effect filters and an Acrobat reader. If you want to have a lot of fun with your own photographs, this is the way to do it.

PCW Details

Price £75 (plus VAT)
Contact Adobe 0181 606 4000

Good Points Superbly designed, easy-to-navigate interface. Highly recommended for beginners.
Bad Points None.

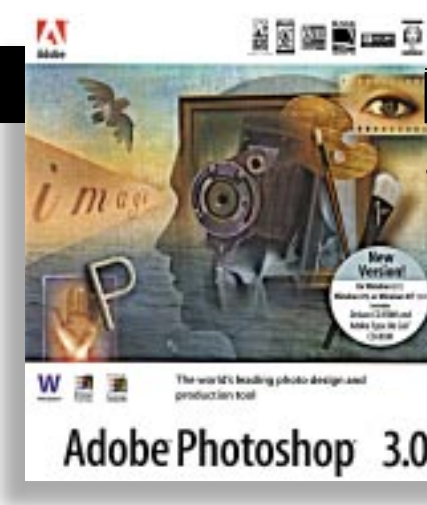
Conclusion The choicest electronic home darkroom around.

Adobe Photoshop 3

The key to Photoshop's power lies not in its toolbox, extensive though it is, but in the multitude of methods on offer for image manipulation, be it subtle shifts in colour balance or creating composite images with blending transitions and semi-transparent overlays.

At the most basic level, Photoshop provides a number of methods for overall image adjustment. Using sliders, histograms or adjustable curves you can make changes to the contrast and brightness, gamma, colour balance, or hue and saturation. But this is basic stuff, available in any shareware package. It starts to get a lot more interesting when you take advantage of Photoshop's ability to make selective changes.

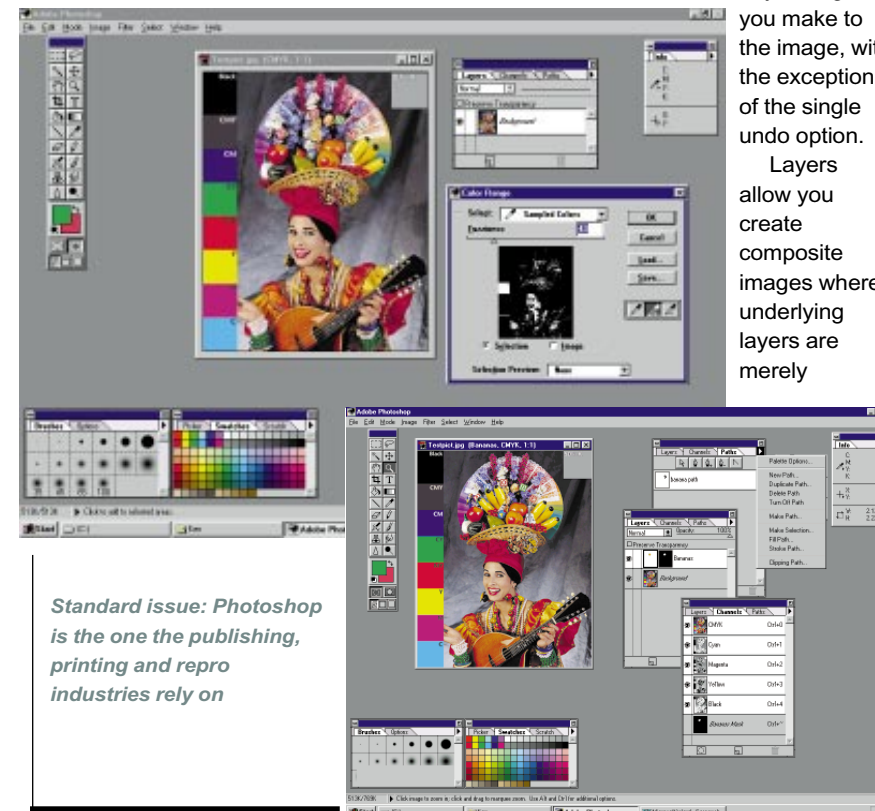
Using the curves panel, for instance, you can make changes to individual channels. So if you are working on a CMYK image it is possible to adjust the yellow channel only. This is, of course, just a different way of colour balancing an image and the ability to apply changes to individual channels is pretty ubiquitous. Channels are used as a means of saving selections and applying masks to the



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EDITOR'S CHOICE

image, so if you've spent some time with Photoshop's excellent selection tools like the magic wand and colour range eyedropper, you can save the results to an alpha channel. Then you can simply load the selection back in when you need it, usually after transforming it in some way, perhaps to produce a drop shadow effect or to apply a filter through a graduated mask.

Layers were introduced with version 3 of Photoshop and provide a much greater degree of flexibility than was previously possible. The problem with nearly all bitmap editing software is that edits are destructive. If you paste something, whatever was underneath is gone for good and the same applies to virtually



Standard issue: Photoshop is the one the publishing, printing and repro industries rely on

any change you make to the image, with the exception of the single undo option.

Layers allow you to create composite images where underlying layers are merely

obscured, not erased by detail on layers above them. All the usual opacity and blending modes are available at the layer level: so you can set the opacity of the upper layer to, say, 50 percent in order that the underlying layers show through; or by selecting one of the blend modes you can define how overlaying pixels will (non-destructively) affect underlying ones. Using Darken, for example will only change the image if the overlaying pixel is darker than the one underneath. Like most things in Photoshop, blend options apply not just to layers, but also to tools and floating selections.

The big advantage of layers is that if something on top doesn't work as expected you can just get rid of it, leaving the untouched original image underneath. The only disadvantages of layers are that they have a huge appetite for memory and if you want to save to a format other than Photoshop 3, say, TIF or GIF, you first have to "flatten" the layers, effectively merging them into one.

There are over 40 filters with the option of adding third-party plug-ins such as the truly excellent KPT range of special effects and texture generating modules. Photoshop will convert your RGB scans to CMYK using the information in the monitor and printing inks set-up preferences. You can also create duo, tri and quadtones for those moody monotone shots with extra detail.

This version of Photoshop is every bit as good as its Mac counterpart, and with the exception of a few stylistic differences it's difficult to tell the two apart. If you're looking for a professional photo image editing package for the PC, you now have the same option that's been a leader in the Mac arena for many years.

PCW Details

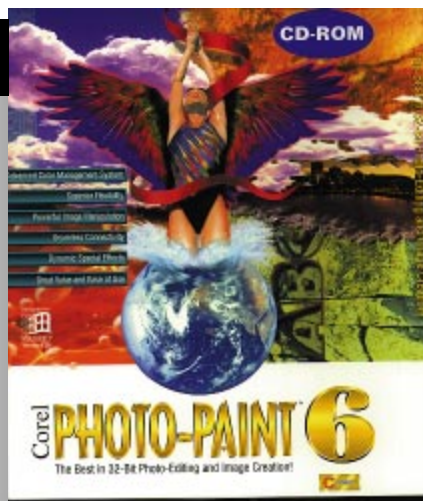
Price Street price £540 (incl. VAT)
Contact Adobe
0181 606 4000

Good Points Excellent facilities. Industry standard.

Bad Points Can be slow with big images. Needs loads of memory to work at its best.

Conclusion The number one tool for photo retouching.

Corel PhotoPaint 6



If Corel continues to buy up companies and products and launches new packages of its own, then at the current rate it won't be long before the rapidly expanding Canadian software giant rivals Microsoft in its influence on desktop PCs. Corel has long been a player in the graphics market and its renowned Draw package is in its sixth incarnation. Bundle is a word that has become synonymous with Corel and the Draw 6 package includes PhotoPaint, Corel's bitmap image editor. PhotoPaint 6 is also available as a standalone product.

Like the other 32-bit applications in Corel's product suite, PhotoPaint takes full advantage of Windows 95 and features an extensive, flexible interface with a vast array of tools, menu options and Corel's trademark 'roll-up' palettes.

A button bar accommodates a familiar array of marquee selectors, vector path, cropping, eye-dropper, eraser, text, paint, smudge and clone tools. Like all the other toolbars, this can float or dock at the screen edge. Initially a colour swatch ribbon appears at the bottom, and a masking and object toolbar appears below the standard toolbar with its save and print, cut and paste, and file info buttons.

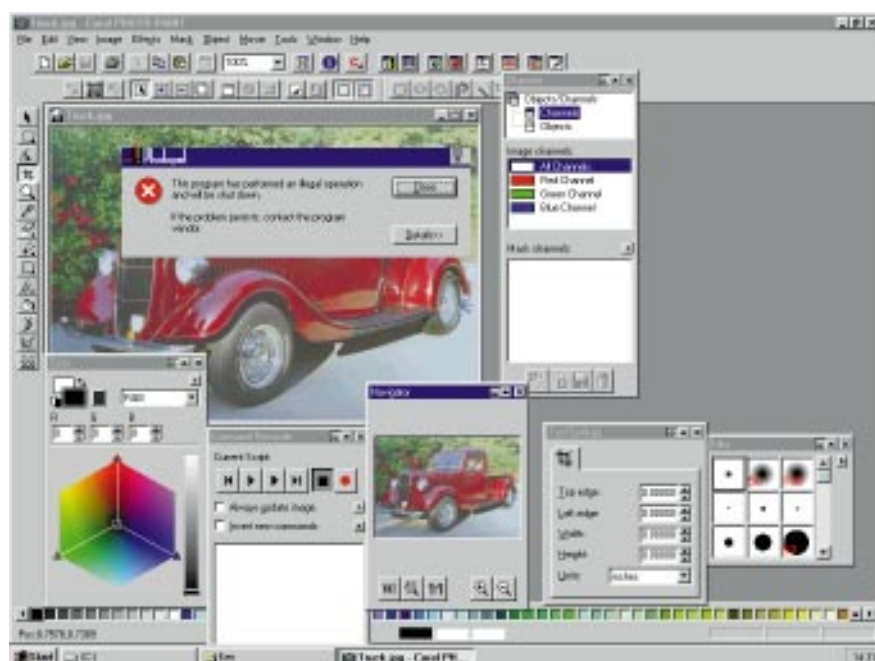
You can radically alter this layout to suit your preference and the right mouse button can be used to quickly add or remove toolbars. Most users will also quickly get into the habit of using the roll-ups, which provide a powerful yet convenient way of accessing features without cluttering the screen.

Despite its breadth, the PhotoPaint interface suffers a little from feature sprawl. It might sound churlish to complain that there's too much in it, but Corel tends to pack so much into its products that it's a problem to organise it all in a logical fashion to be used intuitively. The selection tools, for example, can be used in one of two modes: normal or colour. In normal mode they work, er, normally, selecting an area of the picture bounded by the mask.

A far better way to select on the basis of colour is to use the colour mask roll-up which works in a similar fashion to Photoshop's colour range function, where selection is made on the basis of pixels sampled from the image with an eye-dropper in conjunction with a

this might be a percentage slider for unsharp masking. More complicated plug-ins like Xaos Tools Paint Alchemy, which turns photos into oil paintings, and Terrazzo, which produces stunning kaleidoscope images from a small area of detail in the original, are applications in their own right with a comprehensive set of parameter controls.

PhotoPaint has all the functionality and probably more features than Photoshop.



Doing things to excess: PhotoPaint has an embarrassment of features

tolerance slider. The colour mask roll-up on our copy of PhotoPaint didn't work, however, causing a GPF whenever it was invoked.

One area where an excess of features causes no problem whatsoever is in PhotoPaint's collection of plug-in filters and effects. The effects menu boasts no less than 77 filters, although some of these are image adjustment and colour balancing options. Virtually all offer some form of control over the degree and the method in which the filter is applied. All filters work via a dialogue box which displays before and after images together with control sliders, brush selectors and other adjustment controls. At its simplest,

It provides object, layer and channel options together with opacity and merge modes. The problem is that all these features are wrapped up in a rather loosely-defined interface. You could get used to working this way, but for those with little knowledge of how colour images work and wanting to produce professional colour work, the more

PCWDetails

Price £199 (plus VAT)
Contact Channel Market Makers
01703 814142

Good Points Expansive feature set. Lots of special effect filters.

Bad Points Loosely organised interface. GPF-prone.

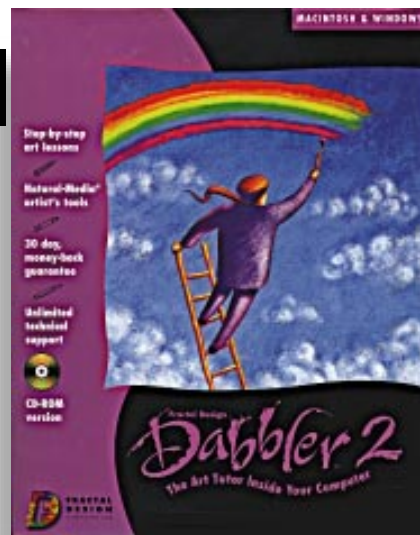
Conclusion The next best thing to Photoshop.

Fractal Design Dabbler 2

Dabbler 2, from Fractal Design (developers of Painter 4), is like Painter 4 and PC Paintbrush, aimed more at those who want to create illustrations from scratch than to edit photographs. As well as a creative tool, Dabbler is now marketed as an art tutor, or to quote verbatim from the blurb: 'The art tutor inside your computer'. The educational element takes the form of two tutorials from Walter Foster Publishing: Drawing Cartoons, by Bruce Blitz, and Cartoon Animation, by Preston Blair. The inclusion of these excellent multimedia tutorials together with Dabbler's flip-book cartoon animation feature makes this the obvious choice for budding cartoonists and animators.

Dabbler comes on a CD-ROM containing versions for Windows 95 and 3.1, as well as 68K Macs and PowerMacs. You also get 100 stock photos and a small collection of font-based clip-art. The Windows 95 typical installation occupies 7Mb of hard disk space; the tutorials remain on the CD which must be present in the drive if you want to run them.

On booting we were confronted with a mess of a screen in which the video information had clearly been badly scrambled somewhere along the line. On



the initial (incorrect) assumption that this might have something to do with the Photoshop plug-ins we had installed, we de-installed and then re-installed everything except the supposedly offending items. That didn't work, but changing from 16-bit to 8-bit did. Dabbler 2 and the STB Powergraph 64 16-bit driver clearly don't see eye to eye and this wasn't to be the only display glitch.

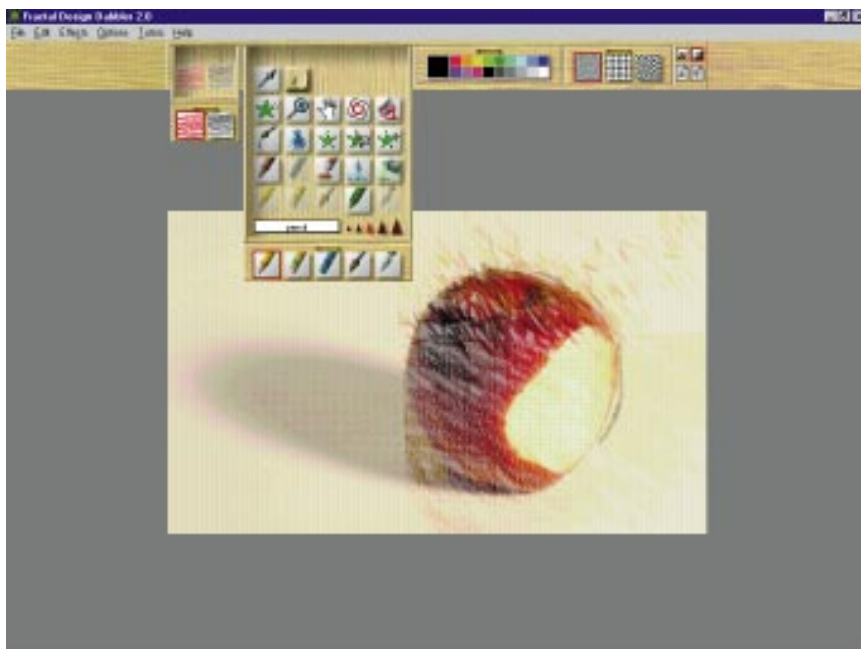
The interface is uncluttered and consists of a canvas area, or sketchbook, which can contain multiple pages surmounted by four drawers. These are for 'Extras', tools, colours and paper. Clicking on the drawer handles opens them so you can select from the contents. The most recently selected items are displayed on the front of the draw when

you close it. The Tools drawer displays the five most recently selected tools, the colours drawer the current palette and so on. It's really just an elaborate pull-down menu.

Given the option (which you'd not), most people would probably prefer a conventional toolbar in which everything you'd likely need is immediately accessible without having to continually open and close drawers. The tool buttons are not particularly recognisable for what they are and a few hints wouldn't have gone astray. The drawer thing is really a bit of a gimmick to emphasise the 'Natural' as opposed to 'Computer' of Dabbler, and it's just an irritation.

The only remaining controls are four buttons in the top right of the screen. Two of these are navigation controls which flip you backwards or forwards through the sketchbook pages. The trace button makes the top sheet semi-transparent so you can trace what's on the sheet underneath. The clone tool used in combination with trace allows you to clone what's on the sheet beneath, using any of the tools. So you could, for example, have a scanned photo on the lower page and turn it into a water-colour or oil painting.

Dabbler's flip-book cartoon animator is simple but effective. You create a flip-book, draw your animation on sequential pages using an advanced trace option to view preceding cells, and play back using a small control panel. Animations can be saved as either video for Windows or QuickTime movies. Used in conjunction with the superbly drawn and narrated tutorials on cartoon animation, this makes an excellent introduction and basic tool for the tyro animator.



Funny business: Dabbler is great for cartoon design

PCW Details

Price £75; upgrade from older version £20 (both plus VAT)

Contact Computers Unlimited
0181 358 5857

Good Points First-rate tutorials. Good animation creator.

Bad Points Flaky display. Obstructive interface.

Conclusion A good choice for budding cartoon animators.

Fractal Design Painter 4



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COMMENDED**

Perhaps the first thing to say about Painter is that if an application can be judged by the results that people have achieved with it, then Painter deserves to win every award going. The sample illustrations provided are absolutely stunning.

As its name suggests, Painter is an artist's tool, a digital alternative to the palette and canvas approach to creative art. You can't miss it: ever since the introduction of Painter, in 1991, it's been packaged in a paint tin, which sounds naff but is actually quite cute.

Painter 4 features a host of improvements and new features, none of them minor. Painters can now avail themselves of shapes (PostScript paths), net-painting (collaborative creation via modem), greater interoperability (with PhotoShop, Illustrator and Freehand), Web Painter (GIF support and embedded URLs) and mosaics (Roman baths art). And that's just the new stuff. Among the improvements Fractal has made to the interface are the inclusion of pull-down menus on floating palettes, a mask edit mode, rulers and guides, and a new scalable patterns palette.

Brushes are organised in a drawer-based floating palette which accommodates both general tool selections and modifiers. A controls palette display gives access to further functions of the selected tool; zoom levels with the magnifier, for instance. Some of the palettes have a lot buried within them but can be flexibly arranged: sub-palette functions can be torn off to create new palettes, for example.

Working through the Painter 4 tutorials provides an excellent guide to the application's basic capabilities. They start with the simple stuff like using the tracing paper function to trace off scanned images and basic painting using the brushes in combination with the colour variability sliders. The brush used for this tutorial is a multicolour brush in which the colour varies across the width of the stroke to give the effect of roughly mixed paint, hastily applied: this kind of attention to the smallest detail is typical.

Subsequent lessons cover, among other things, image retouching, cloning, and working with patterns. The selection tools and somewhat clumsily-named 'coaters' (multiple floating selections)

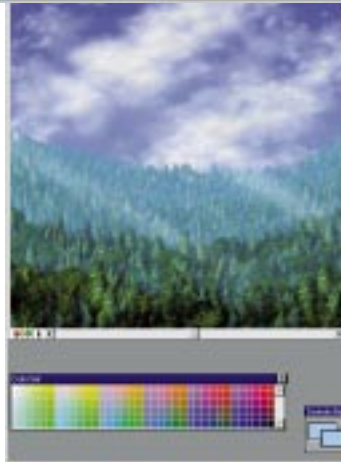
Illustrator to create bezier paths which can be used either as the basis for selection masks, or to create PostScript objects which can be grouped and interleaved with bitmapped floating selections. Using the objects palette you can edit on the basis of either an object or a floating selection, and you can even convert the PostScript shapes into bitmaps by dropping them into the image.

Painter is the kind of program that

makes you want to give up your day job, rent a garret with a power supply and have a great deal of fun. For professional illustrators it makes an excellent creative complement to PhotoShop.



*The view from
Painter is
awesome:
superb
creative tools
enable quite
stunning
results to be
achieved*



are explained in a section on collage.

Painter's new mosaic function gets a section all to itself. Don't confuse this with a one-touch mosaic filter, the results of which look nothing like you'd expect or desire. Painter mosaics require a certain amount of effort on the part of the user. They are painted or cloned manually, but the result looks like real mosaic and is well worth the effort.

Painter's pen tool can be used /a

PCW Details

Price £375; upgrade from older version £115 (both plus VAT)

Contact Computers Unlimited
0181 358 5857

Good Points Superb suite of creative tools. Loads of wonderful new features.

Bad Points Wouldn't run in 16-bit colour mode. Quite complicated.

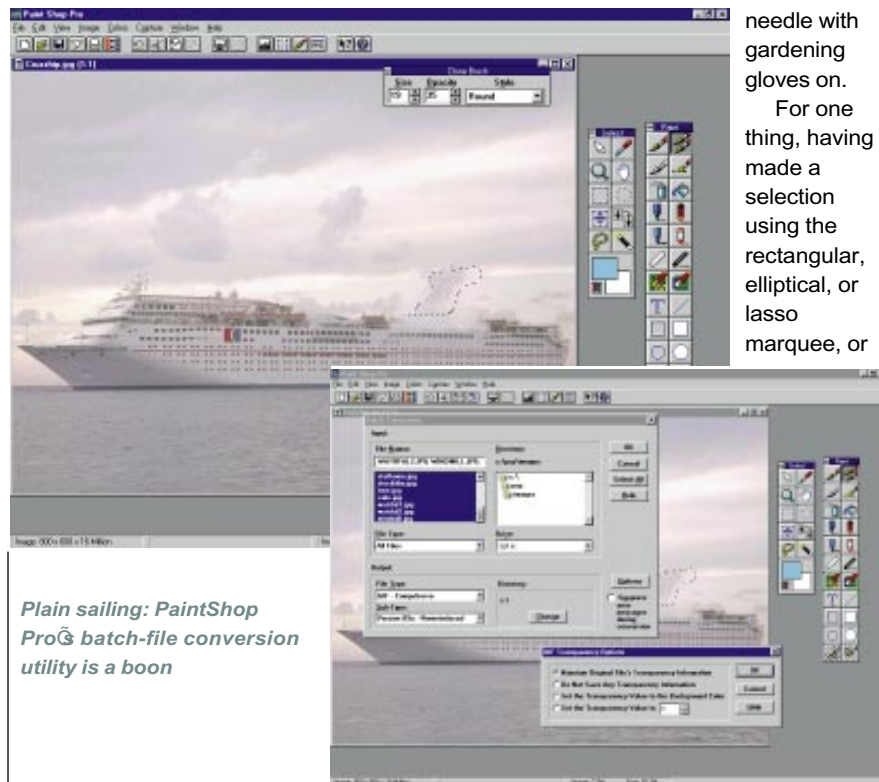
Conclusion If you want to paint without brushes, this is the way to do it.

JASC PaintShop Pro

The shareware version of PaintShop Pro seems to have developed a loyal following, particularly among those who design images for web pages. Three things might explain this popularity. The first is that it confines itself to RGB colour and greyscale images. Secondly, it is one of the only bitmap editors around to offer a batch-file conversion option, which is handy if you need to convert a bucketload of JPEG files to GIFs before lunchtime. Thirdly, the fact that it's available from lots of ftp sites makes it a quick and accessible option. It has some nifty screen capture options, too, of the kind often given away with some graphic cards.

What's the difference between the shareware and the licensed version then? Absolutely none. So anyone with an internet connection would be well advised to ftp a copy and use it for the 30-day evaluation period. If you like it, contact Digital Workshop for the licensed version which will provide the benefits of a decent manual and knowledgeable, helpful, technical support, with regular upgrades.

The four-disc install offers you the option of 32- or 16-bit versions. Windows 95 or NT users will benefit from the



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JUST PAINTSHOP PRO

MORE THAN JUST A PAINT PROGRAM

advantage of long filenames and 32-bit TWAIN drivers. The 32-bit version doesn't offer a lot more, though it's probably faster, and there are no right-mouse button options, for instance. The 32-bit version occupies 6Mb of disk space including 3.5Mb of low-resolution images.

The PaintShop Pro interface belies its shareware origins to some degree but even though it's basic, it is stable and works well. Given that there is an entire panel devoted to selection tools, the selection and editing of parts of the image, whether they be defined by physical proximity or colour similarities, is a bit cumbersome. It's like trying to

thread a needle with gardening gloves on.

For one thing, having made a selection using the rectangular, elliptical, or lasso marquee, or

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COMMEDED**

the basic but excellent magic wand, you cannot use it as a delimiter for the paint tools other than the fill bucket. If you define, say, a rectangular marquee and scribble over it with a paintbrush, you would expect the paint to stop at the marquee border. Not so, in PaintShop Pro.

PaintShop Pro has a reasonable selection of painting and editing tools including a paintbrush, spray can, chalk, charcoal, felt marker, pen and crayon. When selected, each of these pops up an associated control panel which allows some limited modification of the size, style, and in some cases, opacity or strength of the effect.

At first sight the colour adjustment controls seem obtuse, but you need to remember they are intended for modification of screen-displayed RGB images. Under the colours menu, for example, you can separately adjust the RGB channels in percentage increments from plus 100 to minus 100 percent. Sliders would have been a nicer option than the up/down buttons, with counter window provided. The histogram function which simply displays the graph but provides no means of altering it, seems pretty pointless, as does the facility for counting the number of unique colours in an image. However, if you were going to reduce the colour depth I suppose this might give a clue as to the consequences, but actually doing it would provide a better measure.

As a tool for creating and editing simple graphics and pictures for on-screen use, PaintShop Pro does a credible job. Its tools and interface are not the most sophisticated, but it does have some uniquely useful features like batch conversion and screen capture.

PCW Details

Price £49.95 (plus VAT), plus £5 p&p; upgrade from version 2, £19.95 (plus VAT)

Contact Digital Workshop
01295 258335

Good Points Batch-file conversion.

Bad Points Limited tools. No CMYK options.

Conclusion Check out the shareware version before committing yourself.

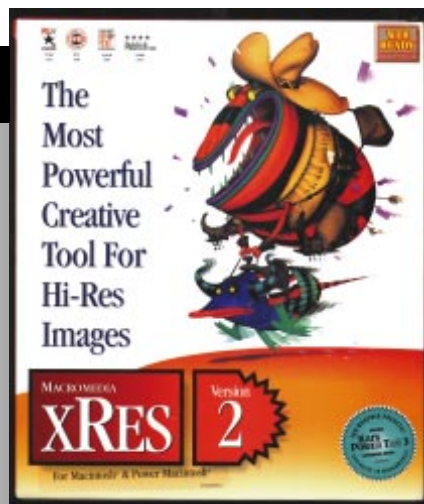
Macromedia Xres2

Xres is a photo-editing and composition tool which provides near realtime on-screen processing of very large image files. Users of Xres 1.0 will hardly recognise this version. The original publisher, Fauve Software, was bought out by Macromedia just over a year ago. Macromedia took Xres 1.0, added the texture-painting features of another Fauve product, Matisse, and revamped the interface so Photoshop users would feel at home. They also added a direct pixel-editing mode for working on small files, and a direct print function (you previously had to export files to print them).

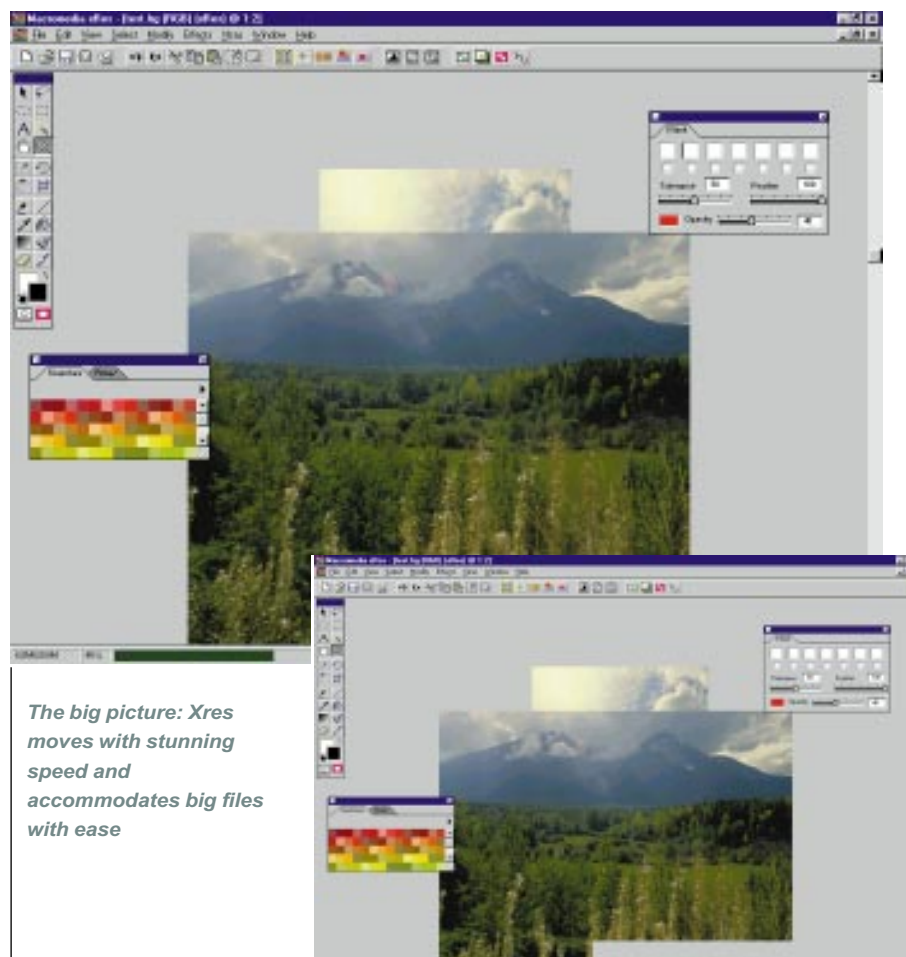
The Xres factor is speed: lots of it when you need it most; applying processor-intensive edits like filters to very large image files. Xres is intended for work on files from 10Mb in size upwards and things happen just as quickly whether your image file is ten or 100Mb. Like Photoshop, Xres eats up disk space when dealing with big pictures and 50Mb is the minimum you're likely to get away with. There's a useful free disk space indicator on the information palette so you'll know if you're running low when there's still time to do something about it.

In Xres mode the speed boost is provided by a combination of delayed and selective processing. You only ever work on part of the image at any one time and the changes you make are applied only to the screen image. A final render stage is therefore necessary before the file is saved in a format other than Xres's proprietary LRG format.

The Windows version of Xres 2.0 suffers from the same fundamental drawback as the Mac version. That is, under certain circumstances its speed advantage withers away to nothing. Xres stores the image at several resolutions for display at different screen magnifications. Each time you zoom in or out, not only does the screen have to be redrawn but all the changes you've made up to that point are reapplied. So unless you're happy working in window magnification the whole time, which is unlikely, performance degrades during the time you are working on an image. One way around this problem is to periodically render an LRG file, make the changes permanent, and then start again.



Xres is nevertheless an excellent tool for working on big files and producing photocompositions. Like Photoshop, it has excellent controls for merging objects and background detail as well as a comprehensive suite of tools and filters. Xres can use third-party plug-ins like KPT, a limited edition of which is supplied free, and also works with PhotoShop plug-ins and Macromedia Xtras. Plug-ins will only work in direct mode, though, so if you were hoping to see the results of special-effect filters in double-quick time



The big picture: Xres moves with stunning speed and accommodates big files with ease

you'll be disappointed. It's also worth noting that the preview box, which lets you see the results of filters and other transformations before you apply them, only works in 24-bit colour mode and will not work with CMYK or 8-bit colour files.

If used as recommended, as an alternative to Photoshop for specific jobs like large Photomontages, Xres will prove to be a valuable addition to the graphic

PCWDetails

Price £549; cross-grade £159 (both plus VAT)

Contact Computers Unlimited
0181 358 5857

Good Points Stunning speed. Accommodates big files with ease. Photoshop-friendly.

Bad Points Lacks stamina; performance deteriorates rapidly under certain circumstances.

Conclusion A must-have for Photoshop users who work with big pictures.

Micrografx Picture Publisher 5

Picture Publisher is no longer available as a standalone product but is part of Micrografx's ABC Graphics Suite which also includes Designer, ABC Flowcharter and the ABC Media Manager. It comes on three CDs: one containing the applications, and the other two containing clip-art and photo libraries. Installation occupies around 12Mb of disk space.

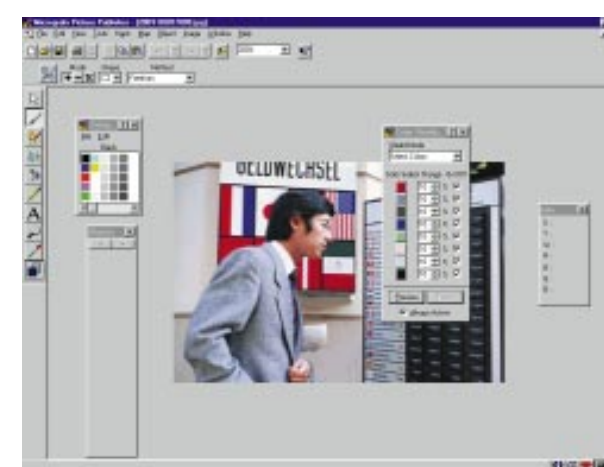
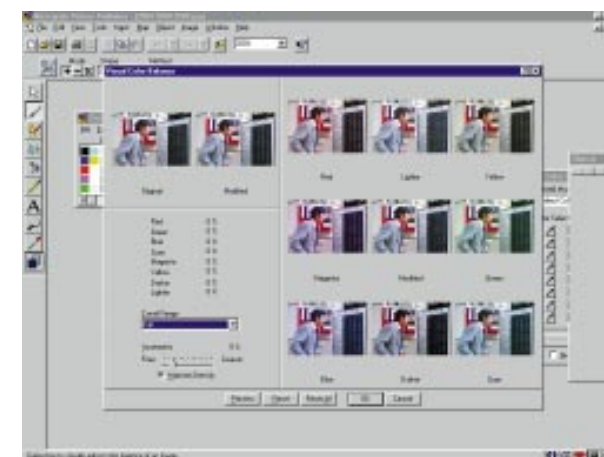
With the ABC Suite, Micrografx has put all its eggs into the Microsoft basket. By making its products Office compatible it hopes to attract Microsoft Office users looking for graphics packages with a familiar interface. Essentially, Office compatible means that the toolbars, menus and hotkeys are the same as those used by MS Office applications.

The majority of buttons are completely new and are explained by hint bubbles (you just need to linger on them a short while with the pointer). There's some quite extensive on-line help, too, which is just as well because Picture publisher doesn't have its own manual. The documentation is an overall ABC graphics suite manual which is project-based rather than application-based.

At first sight, the Picture Publisher interface looks basic and simplistic yet beneath it lurks a level of power and sophistication you couldn't even guess at. At the top is the MS Office-looking standard toolbar with file, save, undo options and so on. The tools that do the real work are docked in a panel to the left. The tool bars can be moved and floated and you can hide and show them, or customise them with a click of the right mouse button. Using the right mouse button in the picture area additionally gives you a quick-access edit menu.

Each of the tools has a flyout with several options and pulls up a context-sensitive modifier ribbon, above the picture window and below the Standard toolbar. So the mask tool flyout, for instance, has rectangular, freehand, paint, magic wand, move, edit points and crop buttons. The paint option is novel: you paint a marquee area using a brush and it's a stunningly effective way to select irregular areas.

With one of the mask tools selected, the modifier ribbon displays plus and minus buttons for adding to, or



Suits you: Picture Publisher has great selection tools and quite advanced colour and modification features

subtracting from, existing selections. There is a shape pull-down and a method pull-down which you can use to constrain the aspect ratio of the marquee.

Generally speaking, Picture

Publisher's colour selection and modification features are quite advanced. The colour balance window provides thumbnail variations on which you click to add more of the required colour. A slider controls the degree of variation from fine to coarse and you can restrict the adjustment to the highlight, midtone or shadow areas.

Another selection feature, unique to Picture Publisher and incredibly useful, is the colour shield. Colour shields are selection masks made on the basis of

similarly coloured pixels throughout the image. A colour is selected with an eye dropper and the tolerance can be varied to select either more or fewer pixels depending on their proximity to the original. Up to eight colour shields can be defined in the colour shield control panel and can be activated, or deactivated, via a check box. In protected mode the shielded pixels are excluded from any edits you make to the image. In selected mode, the colour shields work like any other selection masks.

Picture Publisher is such an excellent package it's a shame Micrografx doesn't sell it on its own. The cost of the whole shooting match is a bit much if you're not interested in the other applications, and although it's good, it's not in the

PCWDetails

Price £199 (plus VAT) RRP; street price £149 (incl. VAT)

Contact Micrografx 0800 626009

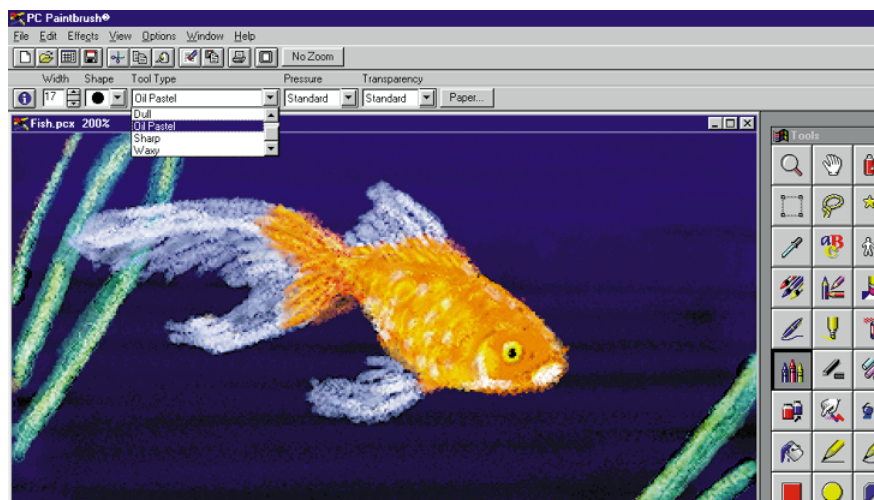
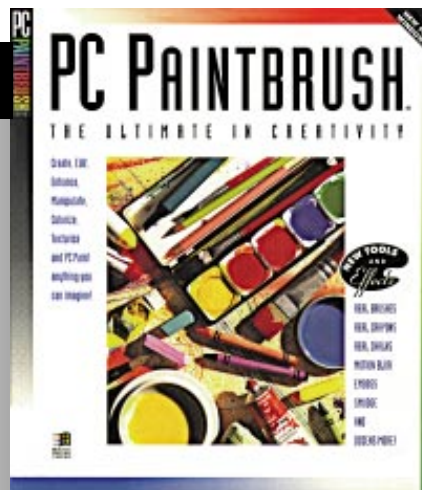
Good Points Excellent selection tools.

Bad Points Not available as a standalone.

Conclusion A great choice if you need an average draw package and a flowcharter application, to boot.

Softkey PC Paintbrush

PC Paintbrush is an altogether different product from leviathans like Photoshop and PhotoPaint as it's a lot smaller in size and scope. The entire package comprises a neat A5 user guide and three floppy disks and occupies 2Mb of disk space, or 5Mb including all the clip-art. While you can use paintbrush to retouch scanned photographic images, it is really intended as a creative tool for



This picture was created using PhotoFinsh ver. 3.1

What a pretty fishy: Paintbrush allows you to create some very natural effects



those who literally want to paint using their PC and start with a blank canvas.

After spending time in the feature-rich environments of packages like Adobe Photoshop, Corel PhotoPaint and Fractal Design Painter, the minimal Paintbrush interface looks rather sparse. But it does have the advantage that you can get to work right away on that stunning abstract composition which, in your heart, you always knew you could create.

There are really only three elements about which you need to know: the picture window which opens by default to a 400 x 300 pixel blank canvas, the colours palette and the toolbox. There's also a standard toolbar with file operation, cut and paste, and buttons. Below that, there's a context-sensitive tool info

panel.

Paintbrush's natural art tools are designed to emulate the real thing as closely as possible. Available tools include a spray can, charcoal, chalk, coloured pencils, felt markers, crayons, and various line and polygon tools.

Once a basic tool has been selected you can change its behaviour from the tool information panel. This allows you to change the size and shape and adjust the pressure and transparency with which the ink, charcoal, chalk or whatever, hits the paper. You can also change the

properties of the paper so it behaves more like bond, vellum, parchment, leather, snakeskin, or whatever it is you're used to scribbling on. Egyptian artists will note with disappointment the lack of a papyrus option.

The other major change you can make to the behaviour of your drawing implement is via the tool-type pull-down. Options here range from your everyday basic paintbrush to jitter (which splashes paint drops), multibrush, Seurat (after the French Impressionist), wash, and wet oil paint (can you paint with dry oil paint?). The Van Gogh option turned out, somewhat disappointingly in my view, not to be an ear-shaped brush, but a parallel series of soft-edged, closely spaced, multi-coloured strokes in a style similar to that of the classical artist. My favourite was jitter rainbow which splashes multicoloured paint all over the place in a style similar to that of contemporary artist Jackson Pollock.

It's not hard to find fault with PC Paintbrush. It hasn't yet gone fully 32-bit for Windows 95 (though it will run under 3.1 or 95) but it's such a simple piece of software that speed is not a problem and you don't need dockable toolbars.

Paintbrush does what it sets out to do and, what's more, does it quite well. The tools really can produce some very natural effects, and you can produce some nice graphics in a very short space of time. It would be ideal for creating artwork for web pages if it weren't for

PCW Details

Price £25.50 (plus VAT)

Contact Softkey International
0181 789 2000

Good Points Inexpensive. Easy to use. Naturalistic painting and drawing tools.

Bad Points Limited in scope. Poor clipart.

Conclusion There are better, though slightly more expensive, options for both painters and photographers, such as PhotoPaint 5, Paintshop Pro and Dabbler 2.

Softkey Photofinish 3

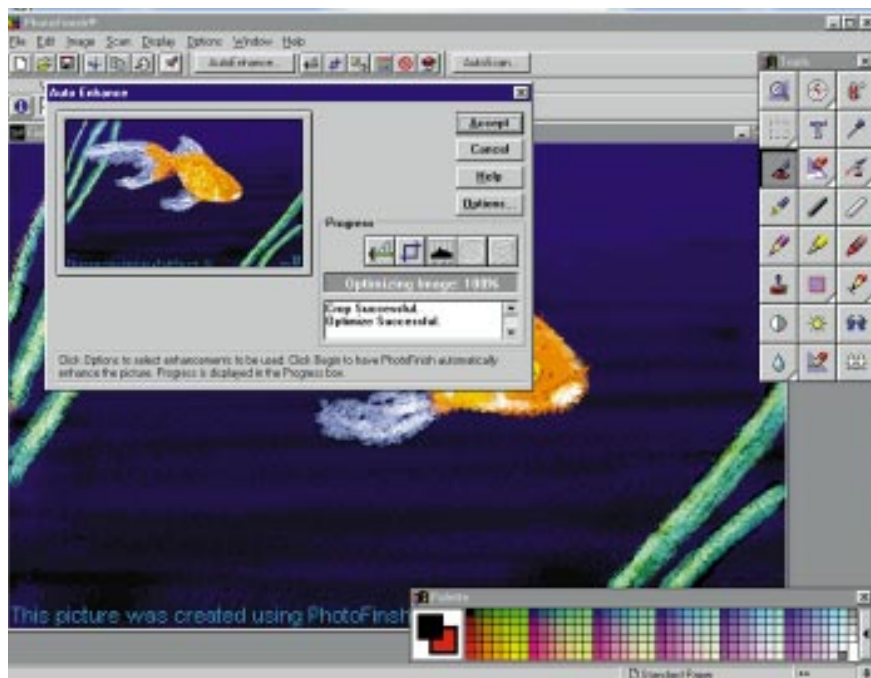
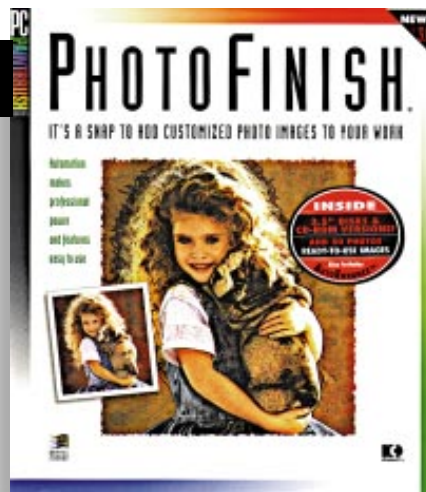
Photofinish is a Zsoft product and now forms part of what Softkey calls its PC Paintbrush series. Not surprisingly, the interface bears more than a passing similarity to that of PC Paintbrush. Photofinish, however, is aimed more at those who want to express their creativity through manipulation of photographic images rather than with digital paint on a blank electronic canvas, and the mix of tools and features reflect this.

Photofinish 3 is supplied on CD-ROM and floppies. In addition to the application, the CD contains 150 JPEG images for business. The installer copies the application, tiles, patterns and tutorial files to your hard disk, which uses around five and a half megabytes of space. Although Version 3 has plenty of new features it's not a 32-bit application, but it ran quite happily under Windows 95.

PC Paintbrush natural art tools and paper textures make their first appearance in Photofinish 3, as does the context-sensitive ribbon bar which provides a further degree of control over tools once they have been selected.

The painting tools themselves are a subset of the PC Paintbrush palette together with some photo-retouching tools. Some of the tool buttons have fly-outs: the rectangular marquee, for example, flies out to reveal a magic wand, ellipse, and scissors options.

With most of the paint tools the ribbon bar allows you to set the size and shape of the brush, the tool type (basic or gritty charcoal, basic or pastel chalk and so on), the pressure, transparency and paper type. The natural paint tools are limited both by their own design and by what you are able to achieve with them in the Photofinish interface. The most fundamental problem is that although you can paint over an image with these tools, you have little control over the degree to which the underlying image contributes to the result. You can, for instance, paint using the underlying image as your



There goes that fish again: Photofinish is fine for photographic images

palette the way you can in Painter. This wouldn't be such a huge drawback if there were some kind of layering or transparency option, so the texture or tone of the image were altered but not the detail.

As it is, it's difficult not to obliterate detail, which is fine if you just want to overpaint an image leaving no trace of the original, but that's not usually the case. The textured paper options, which modify the way paint is applied to the surface, work only on new brush strokes and not on the existing image detail.

There is, however, an extensive range of special-effect filters including emboss blur, fisheye lens, outline, texturise and twist, as well as clean-up filters to

diminish problems like moiré, noise, spots and out-of-focus images. One nice touch is the sample option which shows you thumbnails of your image with each of the filters applied, which saves you the time and effort of going through all the options when you're looking for that elusive special effect.

Another time saver is the autoadjust feature which analyses your picture and applies a series of enhancements

including deskewing, cropping, sharpening, and optimisation of brightness, contrast and saturation.

Photofinish would certainly be a better option than PC Paintbrush if you intend to work either directly or indirectly with scanned images as a basis for illustration, but it lacks the versatility and many of the

features of its competitors. It certainly doesn't live up to the claims it makes regarding power and flexibility, nor is it, as claimed, the industry leader. Far from being the choice of professionals (there's no CMYK mode for a start) it might provide a novice with a useful introduction to photo-editing free of the complexities of some of the more comprehensive packages.

PCW Details

Price £34 (plus VAT)
Contact Softkey 0181 246 4000

Good Points Simple. Good range of filters. Autoenhance feature.

Bad Points Limited and clunky paint tools. No layers or object option. No transparent control.

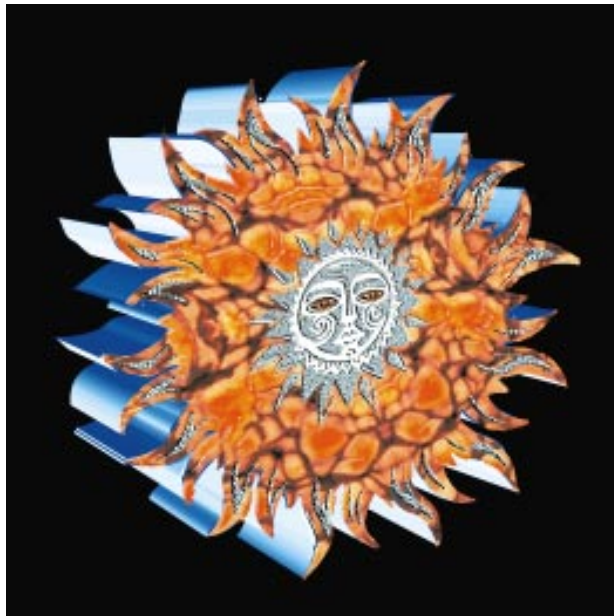
Conclusion Too limited for all but the most casual user.

Case study: a designer's view

Pete Whitaker is a freelance designer who has been using Adobe Photoshop for nearly three years. Like most Photoshop experts he started out on the Mac, but has also used Photoshop on Windows platforms as well as the Silicon Graphics Indy.

Perhaps it's no surprise then that Pete feels most comfortable using Photoshop 3 on his PowerMac. The Silicon Graphics version is in my opinion the worst of the three, because (and I'm talking about version 2.5 now) it wasn't very stable and we tended to lose a lot of time through system crashes. The nice thing about the Windows version is that it's very close to what I was used to working with on the Mac: in fact the only significant differences were stylistic ones to do with the operating system.

The nice thing about the common interface, though, is that I had absolutely no problem working with clients who weren't Mac-based because the software worked in almost exactly the same way, with the exception of trivial things like different keyboard shortcuts which I soon picked up. The cross-platform compatibility also meant that I could finish jobs on my Mac which might have been started on a



A graphic created by Pete Whitaker using Photoshop

client's PC or Indy.

Pete uses Photoshop mainly to carry out retouching to high-quality studio photography for magazine and book publishers and advertisers. His projects have included retouching subjects as

diverse as flowers, high-performance cars, aircraft and gourmet food. The introduction of layers in Photoshop 3 has made life very much easier. Composite images were previously a nightmare. Getting the blends just right was a complicated process and if you got it wrong you often had to revert and start again. Although you need a lot of memory, if you want to work at speed, layers give you much more freedom to experiment.

Another thing I'd say to anyone using, or thinking of using Photoshop, is get a graphics tablet. It's one of those things, like layers, that has made life 100 percent easier.

Not only does it make drawing freehand selection marquees and clipping paths much easier, it also gives you a lot more control when it comes to pressure-sensitive tools like the airbrush, paintbrush, and dodge and burn.

Pointers on plug-ins

Plug-ins are programs used to extend the functionality of a host application. A plug-in could drive a scanner, support additional file formats, or offer new effects filters. An open standard for plug-ins is frequently offered by the writers of the host application in the hope that third parties will also develop for it.

Adobe's Photoshop Plug-in format is accepted as an industry standard; there is a huge variety available and most image applications support them. Compatible applications include Corel PhotoPaint, Fractal Designs Painter and Micrografx Picture Publisher. Adobe also uses the plug-in term to describe the extensions for Premiere, Plug-ins and Illustrator, although these are not necessarily compatible with each other or Photoshop's Plug-ins.

The most common plug-ins consist of file



filters and special-effect filters. Interestingly, Macintosh scanner drivers are usually supplied as Photoshop Plug-ins, while Windows scanner drivers tend to be in the TWAIN format.

Application developers usually offer a host of plug-in filters, but if you get bored or

feel like flexing your creative muscles, we would recommend the best-known plug-in of all: Kai's Power Tools (KPT). Version 3 is available for both Macintosh and Windows, the former enhanced for PowerPC and the latter for Windows 95 and NT. This may seem like a lot of money but KPT offers some unique facilities, particularly for creating background textures and any kind of fractal generation. Its interface is highly original too, as you can see from our screenshot.

PCW Contact

Kai's Power Tools

Price £129 (plus VAT)

Contact Principal Distribution 01706

832000; <http://www.metatools.com>



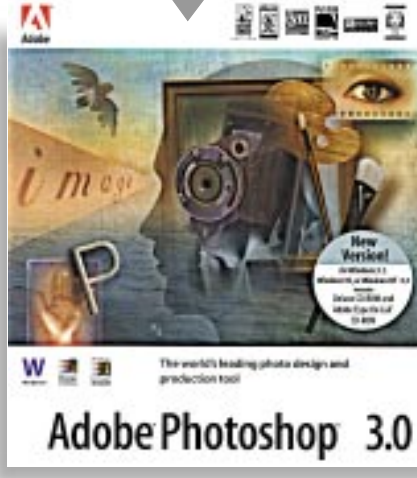
Editor's Choice

Several of the packages here are worthy of the Editor's Choice accolade on the basis of different criteria.

For all-round control, flexibility and a thoroughly professional approach to photo image editing and retouching, PhotoShop is still the unbeaten leader. It provides an outstanding range of tools and plug-ins and as yet unmatched precision control over the appearance of every pixel.

Fractal Design wins hands down when it comes to paint packages. Painter 4 sets the standard for others to follow with its innovative tools and outstanding interface. The mosaic tool has to be worked with so as to fully appreciate its potential, but a look at the artwork on its paint-can packaging will be enough to convince most people.

**Personal
Computer
World**
**EDITOR'S
CHOICE**



On the subject of innovative tools, Painter's amazing image hose has to be seen to be believed. Traditionalists will probably frown, but painting with images is all about the most effective way to create great-looking illustrations in a very short space of time, especially for subjects like sky and vegetation which have lots of repeating elements which change subtly from one part of the image to another.

Fractal's Dabbler also scores highly for its cartoon animation features and the excellent tutorials.

So, the Editor's Choice award has to go to Photoshop, while Painter 4 receives the first Highly Commended accolade. Both are excellent packages and a must for the serious PC painter.

Not far behind Painter 4 comes JASC PaintShop Pro, which is also Highly Commended. You can try this fully-featured shareware program free of charge, and if you decide you like it the registration fee is a very

Glossary of common terms**Bitmap**

Usually a scanned photo or drawing. An image where each pixel is defined as a value representing its colour, as opposed to vector images created in draw packages where lines, fills and suchlike are described by mathematical algorithms. Unlike vector graphics, bitmaps are not scaleable. Enlargement results in a loss of resolution and therefore quality.

Bit Depth

Indicator of colour resolution. Lineart is 1-bit per pixel (-BPP), on is black, off is white. Reasonable-quality screen images can be displayed with 8-BPP giving 256 colours. Intermediate colours are created by dithering. For true photographic quality indistinguishable from continuous tone images, 24-BPP are required (8-BPP for each of the red, green and blue channels). For serious work you will need a graphics card capable of displaying 24-BPP colour.

Clipping path

PostScript vector path, defining the edge of an irregular bitmap, used to cut out and hide unwanted background detail. Files containing clipping paths must be saved in EPS format.

Colour mode

Usually either RGB or CMYK. Put simply, images for screen display should be RGB,

those intended for commercial colour printing should be CMYK. Good packages will convert from one to the other.

Compression

Compresses big image files into more easily-handled proportions. An uncompressed A5 CMYK colour file at 300dpi is around 25Mb in size. Good packages offer file compression options in save dialogue boxes. Most common options are JPEG (quality loss depends on degree of compression defined by the user) and LZW compressed TIFF (no loss of quality).

Filter

Makes alterations to entire or selected parts of an image. It can enhance an image by sharpening, blurring slightly to remove scratches and moiré patterns, or create interesting distortions and other special effects.

Lasso

Freehand selection tool for defining an irregularly shaped group of pixels

Layer/Object

Until the advent of layers, bitmap edits were destructive: anything placed on an image destroyed the underlying detail and any edit pixels remained changed for good. Layers allow you to place pixels on top of others in a non-destructive manner.

Magic Wand

A useful tool which selects groups of pixels on the basis of similarities in colour and tone.

Merge mode

Method by which pasted detail, or layers, can be merged with an underlying area to create semi-transparent effects. Opacity can be varied and various special effects achieved by creating new pixels based on the relative values of the original overlying and underlying pixel values. Options include things like darken only, lighten only, difference, multiply and colour only. Experimentation is required to achieve good results.

Plug-in

Proprietary filter usually supplied by third-party developer (see the *Plug-ins* box, page 183).

Scratch Disk

Hard disk space used by an editing application as virtual memory. Photoshop requires memory up to five times the size of the image being worked on, so even for a lowly 5Mb file you need 25Mb of RAM. As most people don't have that kind of RAM available, the hard disk is put to use. For serious work, repartition your drive so that there's always a good-sized contiguous block available for use as a scratch disk.

TABLE OF FEATURES

	PHOTOSHOP	XRES	PHOTOPAINT	PHOTO DELUXE	PICTURE PUBLISHER
Product	Photoshop 3.05	Macromedia Xres 2.0	PhotoPaint 6	PhotoDeluxe	Picture Publisher
Supplier	Adobe	Computers Unlimited	Channel Market Makers	Adobe	Micrografx
Telephone	0181 606 4000	0181 200 8282	01703 814142	0181 606 4000	0800 626009
Price	£445+VAT average street	£549+VAT	£198+ VAT	£75+VAT	£302 plus VAT

Min. system requirements

	386, DOS 5, Windows 3.1	486, Windows 3.1, 8Mb	486DX, 8Mb RAM	486, 8Mb RAM, 45Mb	386, Windows 95
	10Mb RAM (16Mb with NT)	CD-ROM, 11Mb hard	CD-ROM, Windows 95	hard disk space	8Mb RAM
	20Mb hard disk space	disk space		2x CD-ROM, Win 3.1	10Mb hard disk space
Windows 95 32-bit	Yes	Yes	Yes	Yes	Yes
CD-ROM	Yes	Yes	Yes	Yes	Yes

Support

TWAIN support	Yes	Yes	Yes	Yes	Yes
Layers/Objects	Yes	Yes	Yes	Yes	Yes
Plug-ins support	Yes	Yes	Yes	Yes	Yes
Pressure-sensitive tool support	Yes	Yes	Yes	No	No
CMYK support	Yes	Yes	Yes	no	Yes

Separation

Colour separation	Yes	Yes	Yes	no	Yes
TIFF	Yes	Yes	Yes	Yes	Yes
EPS	Yes	Yes	Yes	Yes	Yes
GIF	Yes	Yes	Yes	Yes	Yes
BMP	Yes	Yes	Yes	Yes	No/Yes
PCX	Yes	Yes	Yes	Yes	Yes
JPEG	Yes	Yes	Yes	Yes	Yes

Extras

	Acrobat reader, stock photography	KPT 3 Limited Edition	Large clip-art and stock photo library	Metatools filters Diamar Interactive Better Photography After Dark, Acrobat Reader	30,000 clip-art images stock photography, fonts
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TABLE OF FEATURES

	PC PAINTERUSH	PHOTOFINISH	PAINTSHOP PRO	PAINTER 4	DABBLER
Product	PC Painterbrush	Photofinish V3	PaintShop Pro 3.12	Painter 4	Dabblor 2
Supplier	Softkey	Softkey	Digital Workshop	Computers Unlimited	Computers Unlimited
Telephone	0181 246 4000	0181 246 4000	01295 258335	0181 358 5857	0181 358 5857
Price	£25.50 plus VAT	£34 plus VAT	£49.95 plus £5 P&P plus VAT Upgrade from V2 £19.95 plus VAT	£375 plus VAT Upgrade £115	£75 plus VAT Upgrade £30

Min. system requirements

	386, Windows 3.1	386, Windows 3.1	386, 4Mb RAM	486, 8Mb RAM	486DX 8Mb RAM
	hard disk, 2Mb RAM	5Mb hard disk space	hard disk, Windows 3.1	hard disk, Windows 3.1	hard disk, Windows 3.1
		4Mb RAM		CD-ROM	CD-ROM
Windows 95 32 bit	No	No	Yes	Yes	Yes
CD-ROM	No	Yes	No	Yes	Yes

Support

TWAIN support	No	Yes	Yes	Yes	No
Layers/Objects	No	No	No	Yes	No
Plug-ins support	No	No	Yes	Yes	No
Pressure-sensitive tool support	No	Yes	No	Yes	No
CMYK support	No	No	No	Yes	No

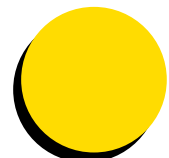
Separation

Colour separation	No	No	No	Yes	No
TIFF	Yes	Yes	Yes	Yes	Yes
EPS	Yes	Yes	Yes	Yes	Yes
GIF	Yes	Yes	Yes	Yes	No
BMP	Yes	Yes	Yes	Yes	Yes
PCX	Yes	Yes	Yes	Yes	Yes
JPEG	Yes	Yes	Yes	Yes	No

Extras

	Small clip-art library	Stock photography (business)	Clip-art	100 stock photos, 100 patterns, 100 image hose nozzles	Stock photography Multimedia art tutors Cartooning and cartoon animation
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CUTTING EDGE

On the

Welcome to Cutting Edge, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs, with features keeping you right up to date with computing and the internet.

We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

PCW Online

- 1 9 2 **Focus** — Online education: it's now possible, through the internet, to further your education. Wendy M Grossman learned a thing or two.
- 1 9 7 **Focus** — Dylan Armbrust goes on tour with the stones — Stonehenge, that is.
- 1 9 8 **net.news** — Reachout and touch any PC from your favourite web browser; Quza is in business; Java peaks in HTML, and Jamba brings Java to the masses. Net news rounded up by PJ Fisher.
- 2 0 6 **net.answers** — How to achieve a reliable download; will you pass the Serial Port Speed Test?; problems with bouncing email; and London Stock Exchange prices via the net. Nigel Whitfield sorts you out.
- 2 1 0 **net.newbies** — How to get online, with ease.

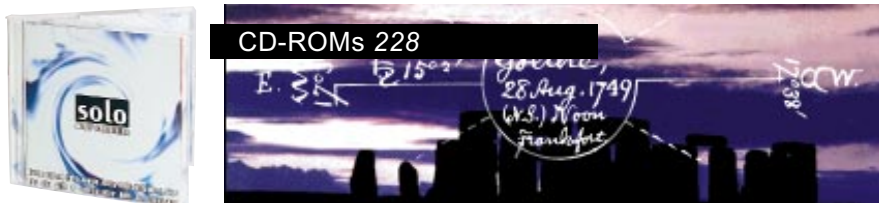
PCW Futures

- 2 1 1 **Innovations** — Damn clever, these Japanese: now they're supporting High Quality Audio Discs.
- 2 1 2 **Horizons** — Mbone is giving media moguls something to chew on: sending video entertainment across the internet.
- 2 1 3 **Bluesky** — The quantum computer would change IT forever. But will it ever become a reality?
- 2 1 6 **Retro Computing** — Windows 3.0 is six years old. Compared to Win95 it's rather clunky and dated, but it changed the face of computing.

PCW Media

- 2 1 7 **Books** — Making Sense of Java, Designing for the Web, and Agents Unleashed (complete with James Bond-style film script).
- 2 2 8 **CD-ROMs** — Albert Einstein enthalls, The Unexplained sends shivers, Lost Treasures teases, and Frommer's guide to New York City excites.

CD-ROMs 228



Books 217



Screenplay 233



Kids' Stuff 220



PCW Fun

- 2 2 0 **Kids' Stuff** — Timon the meerkat and Pumbaa the wart-hog go solo; Winnie the Pooh is in a sticky situation; the Zoombinis take a logical trip; and Mr Potato Head is a hero.
- 2 2 3 **Screenplay** — Quake: will you quake in yours boots? Actua Sports Euro 96: one way for England to beat the Germans...
- 2 3 6 **Leisure Lines** — Puzzles with JJ Clessa.
- 2 3 8 **Competition** — Fancy a quick bite? Your chance to win a trip to Transylvania and Dracula's castle.

Degrees of change

Electronic education: pure fiction, or a fact of today's busy lifestyles? Wendy M Grossman registers the pros and cons of online learning.

In about 1980, a 38-year-old friend of mine pronounced a verdict on the prospects for change in people's lives: how you are when you leave school, is how you remain. He was then a sales representative in a sharp suit. Now he's a student in pursuit of a doctorate in law, wearing jeans, workmen's boots and a scruffy denim jacket. I was then a folk singer.

Changing careers is no longer such an uncommon thing to do. Even a single career may demand new skills and further education as you progress, and technology and circumstances change. It's becoming less and less reasonable in most fields to expect to learn a job at 18 and stick to the same methods your entire working life.

Time for study

It's social changes like these that prompts politicians to talk about lifelong learning. But fitting further education into a working life when you also have family interests to consider, is difficult.

"Traditional residential education," says Richard Crews, "other than in late adolescence where it serves a social function, too, doesn't fit into people's lives." Crews is involved with two organisations, both in the field of distance learning. First is Columbia Pacific University, a correspondence school using telephone and postal services for communications; he has been its

president for 18 years. The other is the start-up Wyoming College of Advanced Studies (WCAS), which has assembled a faculty from schools all over the US to offer an online MBA programme. Enrolment is continuous: you can start at any time and proceed at your own pace. All communication is electronic. So far the new school, which planted its ivy in January, has one student.

But lest you think the internet is a cheap option, WCAS is expensive. It's charging \$13,000 for the full degree programme of four terms, with a \$2,000 discount for the English-only programme (WCAS also offers Japanese, Chinese, and Spanish-language programmes). For that sort of money, you could get what a snob would call a *real* degree from a *real* university.

Asked whether he thinks that sort of snobbery will ever go away, Crews says, "I would hope

not." His doctorate is from Harvard. He holds, though, to his main point: the programme is "for people who are already in business and don't want to dislocate their careers. They want to fit it into evenings, weekends and an otherwise busy life, expand their business skills and enhance their credentials and reputation without taking their lives apart to do it."

Statistics from the Open University, which arguably leads the world in distance learning, tend to bear out his ideas. In 1994, the OU counted 149,614 students, two-thirds of them based in England; 132,794 of them were undergraduates. Of those undergraduates, 51 percent were male and 36 percent had less than A-level qualifications on entry. Their median age was 37. That seems, if anything, unexpectedly young: my mother took

great satisfaction in completing her BA degree at New York's Fordham University when she was in her seventies.

Undergraduate degrees at the OU cost about £2,800 for a BA or BSc. MBAs are more expensive; roughly £7,300. Those average prices include tuition and residential school fees, travel, postage, books and materials for the necessary number of courses and years of study.

Courses of action

MBAs are probably the most common real-world degrees to find dispensed online; teacher training is also fairly common. Like everything else on the internet, growth in this area has been shocking. Eighteen months ago, there were a handful of degree-bearing courses. Now, even if you leave out the many online courses which are specifically computer-orientated, the list you get just from searching Yahoo seems endless. Another long list shows up on Apple's web site — the Macintosh has long focused on the education market. This one is only partly advertising. Most of the links lead to programmes offering accredited courses from such well-known US institutions as UCLA and the University of Massachusetts at Dartmouth. Dartmouth's programme, CyberEd, aims to "deliver education" to the student's desktop that rivals classroom-based learning.



PCW Illustration by Marc Arundale

Other institutions, like the WCAS, are new, created for the net, as is the Globewide Network Academy, which aims to catalogue online courses and help match them to would-be students, and also the Virtual Online University. More research-orientated is the Open University's new Knowledge Media Institute, which joins together three OU teams with the goal of gaining "some insights

into what it means to share knowledge" as well as answering questions about how to use the technology to assist many types of students in many types of situations "in the service of human understanding".

Isolated subjects

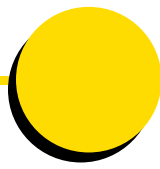
For the moment, the biggest difference the technology is likely to make is in isolated and rural areas. In Wales, for instance, the

teaching of certain A-level subjects like Spanish, business studies, systems electronics, and sociology, is managed from a centre in Llangefni, near Anglesey. The key here is that these are minority subjects which the small, widely scattered schools in Wales would otherwise be unable to offer. In some schools you'd be looking at classes for only two students.

Overall, the system works

well according to Martin Owen, at the Department of Education at the University of Bangor. "The statistics would indicate that students at a distance tend to perform better," he says, but admits that no follow-up studies of these students' University careers have been carried out.

These distance courses use a mix of technology such as video-conferencing, ISDN and what they call audiographics: that is,



audioconferencing synchronised with shared computer-screen conferencing so that students can share data. Historically (Wales has been using some of this technology since 1985), most of the communications have been handled via leased lines but the schools are moving to ISDN-based internet access over the coming year because it's cheaper.

"It doesn't replicate the traditional classroom," says David Black, teacher of Spanish at the Llangefní centre, "but it comes fairly near. It's not nearly as daunting as people think. I believe it exerts a discipline on the pupils — they have to structure their conversation and participation, and the teacher has to be well prepared. Most of all, they're not there as passive consumers, so there has to be supporting interactive materials. And I would say materials are the most critical factor in distance learning." He says there are no discipline problems with the system. A-level students are a self-selecting group in any case but on top of that, he says "There's no challenge." Students could simply switch off the link.

Owen is also the leader of the 1.4 million ECU (roughly £350,000) REM project, part of the EC's DGXIII Telematics Education and Training Project sponsored by Apple Europe. This spreads across 11 institutions in eight European countries and aims to train teachers to teach through network-based learning.

Schools get wired

Technology in education is, of course, not limited to these higher levels. All three main British political parties are committed to wiring up the schools with a mix of funding from government and industry.

Currently in progress is the Schools OnLine project, a joint initiative sponsored by the Minister for Science and Technology, Ian Taylor, supported by the Department of Trade and Industry, and administered by the Federation of the Electronics Industry. It is one of a number of projects of the UKNII Task Force, a group of about 30 IT and telecommunications companies including IBM, ICL, Apricot, Northern Telecom, DEC, Intel, Motorola, Apple, US Robotics, Research Machines, and Oracle. The project involves around 60 secondary schools and sixth form colleges scattered throughout England and Wales (the companies can choose the schools they want to sponsor).

The primary focus, explains project manager Tom King, is on science and modern foreign languages. "We're finding that all the schools, and most have filled in a

questionnaire, are very enthusiastic about it. There are issues like paying for the phone calls, that's a problem; and managing it into the curriculum and finding classroom time is a problem because they have all these other things they need to do. But they're finding it very rich in information, very motivating for the kids, and they're starting to be creative with it." Overall, he says "We see Schools OnLine as a research project to start demonstrating and proving the benefits of using the internet in schools."

Other experiments include the one in the MP, David Shaw's (Con, Dover and Deal), constituency where, in co-operation with US Congressman Tom Petri, a local school was hooked up to one in Wisconsin. The two schools exchanged email and other information. "It was useful for the pupils at Walmer School, who learned a lot about the lifestyles and geography of an area 4,000 miles from their own homes," says Shaw. "I hope more schools will set up transatlantic links."

Plus and minus

There are plenty of critics of the vogue for wiring classrooms when it's not yet clear that email is much of an improvement over old-style pen-pals. Last year, Clifford Stoll, the man who caught the hacker in The Cuckoo's Egg, argued in his book-length rant, Silicon Snake Oil, that it's a mistaken waste of resources. "Think of three multimedia experiences that changed your life," he challenges, "Now think of three teachers who changed your life." In a long chapter on education, he argued that the many millions of pounds being spent on computers and internet hook-ups for classrooms would be better spent on traditional learning materials like books, and that children should be getting hands-on experience, particularly in the sciences, rather than learning to produce the right answers for software programs.

Stoll's critics claim his views are narrow. Sherry Turkle, a psychologist at the Massachusetts Institute of Technology, has mixed feelings. She is impressed by the way computer connections can bring hope to kids in deprived areas, where otherwise there is none. But she, like others, is unhappy that installing technology seems to be a political substitute for addressing more difficult issues of social policy. "I see many positive educational benefits," she says, "but it's no substitute for giving kids a school lunch programme, or putting a piano in their school, for example."

Others in the field point out that the technology has some benefits. In a traditional classroom, for instance, it may be difficult for

Choosing a course

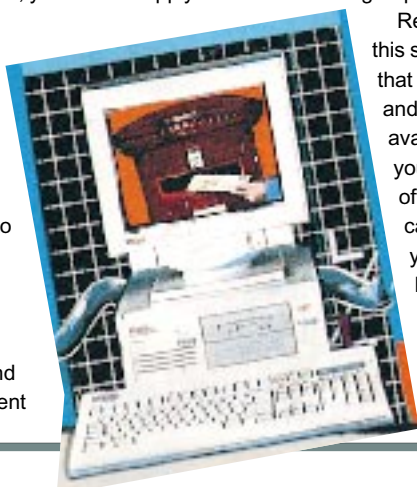
Americans are used to the idea of researching schools because the process of applying to colleges and universities in the US is a complex, drawn-out process of picking four or five schools from the hundreds of institutions across the country and then applying to them. Typically, by April of their last year in secondary school, American students know where they've been accepted and plan accordingly. If you're going to do an online degree, especially one of the more expensive MBA programmes, you need to apply a measure of the same care.

The most important thing is to check whether the course is accredited and by whom. This is important as there's no point spending time and money on taking a degree to improve your career prospects if, ultimately, its value won't be accepted by those to whom it matters.

Beyond that, bear in mind that there are several different

types of course using different sorts of technology. Think hard about whether you want to be able to interact with other students, often one of the significant benefits of classroom-based education. If you do, look for a programme that uses electronic conferencing rather than just one-to-one contact via email and mass distribution of course materials via the web. Some programmes also build in brief periods of on-campus residency, maintaining that this is vital for certain types of group work.

Remember that the good side of this sort of programme ought to be that it gives you greater variety and choice than would be available to you locally. Check your local adult college's course offerings to make sure this is the case. Also, consider whether you are the type of person who learns well without live, human guidance: you don't want to contribute to the drop-out rate at your own expense.



a teacher to know accurately what contributions a class member makes. On an electronic conferencing system, that data is easily compiled. Similarly, some types of work can be checked in more detail by computer.

But leave it to a chance acquaintance who teaches in an inner-city New York school. Would he like an internet connection for his classroom? He shrugs. "Not really. I wouldn't know what to do with it." His big problem, he says, is the one or two disruptive kids in every class whose behaviour rubs off on the rest of the students. He thinks again, looking at a nearby laptop and amends what he said: "Teaching methods haven't changed since the Middle Ages. It takes patience to read a book. Maybe they'd find the interactive stuff more engaging."

Funding and training

Whatever doubts are being voiced elsewhere, all the main

political parties seem to be committed to wiring the schools, and all agree that the initiative should be paid for with a mix of state and private sector funding. The Liberal Democrats, which have for some years pledged to increase educational spending at a cost of 1p in the pound on income tax, are also keen on investing in training for teachers who are already in action.

Don Frost, MP (LibDem, Bath), believes that politicians talk "far too much about the hardware — how to get more computers into schools, how to supply them with relevant software without adding the other side of the coin." In other words, "We have 425,000 teachers in our schools, the vast majority of whom have had no real introduction to the information superhighway or communications, so as well as talking about getting the kit into schools we have to talk about a massive in-service training programme."

New technology, he believes, will give teachers added options in how they teach children and the changes will be profound. "So much of what education has been about has been the imparting of content to children. Now content can be obtained by any child via the information superhighway." The result will be altered roles for teachers. "Tolstoy said the job of the teacher is to make available the choice of all known and unknown methods that will make the matter of learning easier for the pupil, and part of the process of doing that is recognising that the teacher may be one of the best resources in the classroom."

Frost's comments are echoed in an unexpected place: on the web pages of one of the newest internet institutions, the Globewide Network Academy. "The most fundamental thing about education is the sacred bond between a student and a teacher," writes Joseph Wang, the GNA's president. "This was

true thousands of years ago. It will be true thousands of years from now. The internet and all the technology in the world will not change this." ■

PCW Contacts

Amazon:

<http://www.amazon.com>. Huge internet bookstore whose stock includes several titles on distance learning online.

Apple America's Higher Education: Distance Learning:

<http://hed.info.apple.com/distance.html>. Tools for creating a virtual campus and links to a number of online programmes.

BT Campus World:

<http://www.campus.bt.com/CampusWorld/pub/CWtaste/Science/index.html>.

Distance Learning Resource Network:

<http://www.fwl.org/edtech/dlrm.html>.

Globewide Network Academy:

<http://www.gnacademy.org:8001/>

International Centre for Distance Learning:

<http://www.acacia.open.ac.uk/Online.html>.

Instructions for accessing the Open University's database of distance-learning resources (course listings, journal articles, research reports) via Telnet.

Open University: (

01908) 274066. Web <http://www.open.ac.uk>. Also look for the Knowledge Media Institute on the OU pages.

Research Machines ("EduWeb"):

<http://www.rmplc.co.uk>. Leads to many school pages.

Schools Online:

http://sol.ultralab.anglia.ac.uk/pages/schools_online/

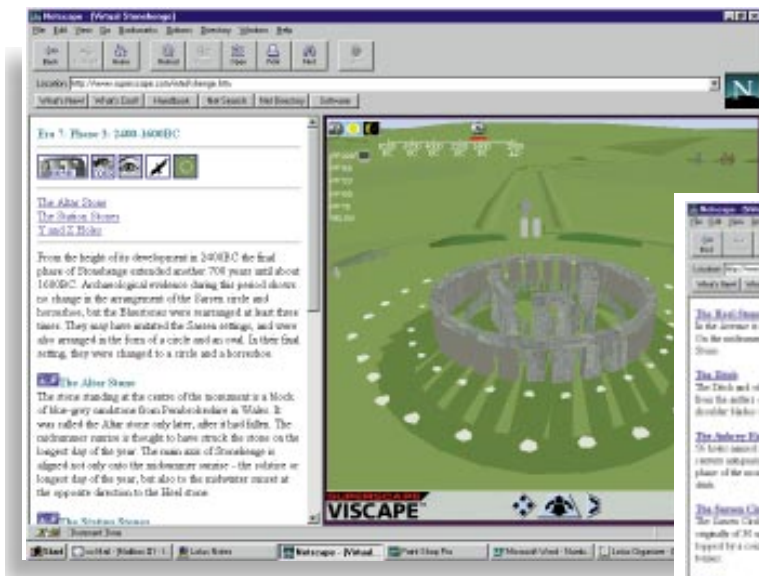
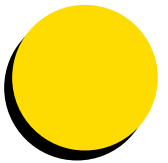
University of Bangor's REM project:

<http://weblife.bangor.ac.uk/rem/rem.html>.

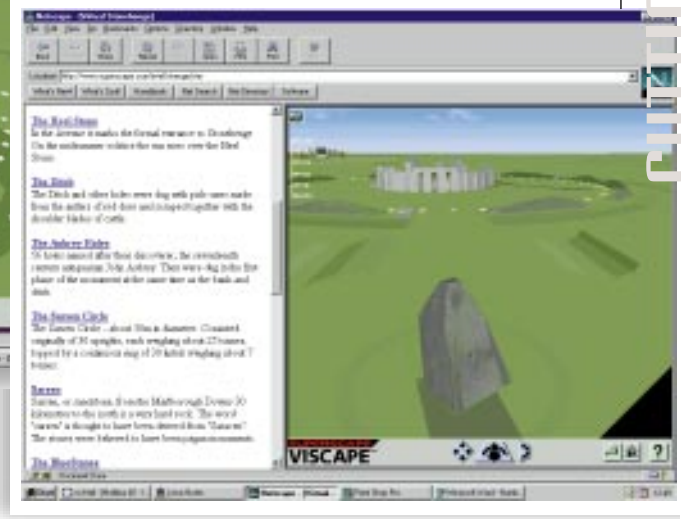
Wyoming College of Advanced Studies:

<http://www.wdcas.com/inde.htm>.

Email: wcasmba@aol.com.



Roam alone through the stones. With the protection now afforded Stonehenge these days, this is the best view you're likely to get



On tour with the stones

Dylan Armbrust takes a trip around the impressive English Heritage web site — a virtual 3D Stonehenge with real-time rendering.

JUST WHEN YOU THOUGHT the internet was becoming overloaded with junk sites and mediocrity, something comes along to redeem one's faith. That something is the English Heritage virtual Stonehenge 3D web site. Without a doubt, this is the best web site we have seen for a long time and, believe me, we've seen a lot of sites.

Stonehenge 3D is the joint creation of English Heritage and Intel Corporation (UK), in association with Superscape VR. It was launched on the same day as the summer solstice to emphasise the historical significance of Stonehenge.

The site is impressive and can be accessed at different levels. You can enter as a tourist, a student, or a time-traveller. It really is three-dimensional and has real-time rendering.

To gain access, you must

download Superscape's Viscape, a free Netscape plug-in that allows for real-time interactive 3D movement in a web site. The plug-in is available from Intel or Superscape's web sites and, with a file-size of about 1.8Mb, takes approximately 10 to 15 minutes to download on a 28.8 modem. Regrettably, it is only available to PC systems using Windows 3.1, Windows for Workgroups, Windows NT or Windows 95. Mac users are out of luck and Superscape has no plans to develop a Mac version at the moment.

The model takes up only 800Kb of PC storage space, but the download from the internet is compressed to 380Kb. That 380Kb is then broken down into 57 files, each no larger than 8Kb, and the 3D virtual world itself accounts for 244Kb of the total.

As you navigate through the model, the files decompress on

the fly, and the image is rendered in real time. The small amount of storage space used seems remarkable when you explore the site and discover its many features.

There is an innovative, two-way link between textual information and the VR model, so when you highlight the relevant text, the 3D object appears, and vice versa. The sliding CPU scale allows the user to adjust the model, rendering detail and speed according to the processor you have at home.

If you have a Pentium 100MHz chip, all you do is set the sliding scale to P100 and the model automatically adjusts its 3D-rendering to accommodate processing power. The faster the processor, the better the detail in the model you see, such as stone-texture and shadowing.

The web site is optimally set for a P133 but you can select any setting you want. Movement and rendering would be slow and jerky if you chose the P166 rating for a 486DX4 100MHz processor.

The site itself is easy to use.

It opens up to a split-screen, with text on the left and the 3D model on the right. Apart from the introductory home page, there are five viewing options to choose from: Tour, Time, Eye, Bird's Eye, and Plane View.

The Tour option takes you through the current ruins and allows you to roam the stones on your own, or you can go on a guided tour. Here, the two-way link comes into play, highlighting the features as you walk along. As you approach a feature, say the heel stone, it is highlighted by a green box and the related text appears. You can opt to see the sun or moon rise at the summer solstice.

This web site is the only site we know of where the web-surfer can enter a site and, via the two-way linking technology, change the variables of their viewing experience. Whether there are two or two hundred users using the site, each will have a completely different experience from the others.

Check it out: you won't be disappointed.

● www.intel.com / ● www.superscape.com



net.news

Reach out for any PC

Stac is promising remote access to any PC from your favourite web browser with ReachOut version 6.0. The new product was announced at Networks 96, the UK's biggest networking trade show. The new version of its popular remote access product is now fully configured for Windows 95.

Windows 95 users will be able to access remote desktops directly within web browsers, including Netscape Navigator and Microsoft Internet Explorer 2.0.

By using the FTP protocol

and the new PersonalFTP Server included with ReachOut, users can make their desktops available to controlled and authorised users from the internet. ReachOut claims that password protection and IP access restriction protocols will make access as secure as possible.

An enhanced SuperFTP Client offers a Windows 95 Explorer-style interface which, ReachOut claims, is unique among FTP clients.

Users will be able to drag and drop files as well as multitask

while working remotely. They can now access PCs anywhere in the world without the need to carry a notebook. According to Stac, all you need to do is find a PC which has a web browser installed.

The new version will also support ReachOut for Windows 3.1 and DOS, to ensure Windows 95 machines can control PCs thus equipped.

A public beta of ReachOut 6.0

is available from Stac's web site, and the full version will be available by the end of August for about £149.

Stac is the latest company to adopt the trend of making beta software publicly available via web sites, and will continue the policy with other releases. Upgrades will be available for registered users of previous versions of ReachOut.

● <http://www.stac.com>

WINDOWS[®]95, WINDOWS & DOS

REACHOUT 6.0

Use Any Web Browser To Access Your Desktop Files

MODEM NETWORK REMOTE NODE INTERNET

New internet service means business

Quza is a new internet service, aimed squarely at business users. It is based on the independent Racal ATM backbone.

Internet service specialist, Integralis, has formed the new company with Racal, and will supply support and management of network accounts. Racal is investing over £120m in its ATM network over the next three years.

Quza is a strange name, but Racal Network Services and Integralis wanted a name that would be recognisable the world over, reflecting the ambition of the new alliance.

Quza has been designed as more than just another ISP service. It will be business-

dedicated, offering a complete design and consultancy service in addition to a dedicated network.

Kevin Washburn, director of Integralis, believes that the bandwidth of the Racal network will let businesses build multimedia applications on the web, and deliver goods and services across the web, rather than building "we are here" web sites.

Racal is no stranger to building dedicated networks; it designed and built the retail network for Camelot, the providers of the UK National Lottery. Both partners are looking to sell Quza to government and NHS customers. Racal already has many health-sector customers and believes that a

reliable, strong bandwidth connection will appeal to surgeries wishing to go online.

Peter Burke, marketing manager of Racal Managed Services,

was dismissive of BT's recently announced rival, Concert Internet Plus, believing the Racal network to be superior.

● <http://www.QUZA.com>

Nimby keeps an eye on ISP performance

Also from Integralis comes Nimby, a business application to assess the performance of Internet Service Providers (ISPs).

Nimby is part of Quza, and communicates with routers and web servers on the internet. Like a ping application, it measures the time elapsed before a response is received, and performs a reverse address search to measure performance of ISP routers and networks.

"One of the major issues affecting internet take-up is poor performance; in particular, slow rates of data transmission," said Integralis' Kevin Washburn.

Nimby displays a series of tables which indicate router and server responses. Integralis promises future versions will include an Intelligent Agent to monitor and warn users of adverse network conditions.

Peak's package first to pick Java

Peak Technologies has built an HTML web-editing package entirely in Java. It is likely to be the world's first commercially available application written in Java.

Peak claims that users don't need to know anything about Java. The software is aimed at non-technical users who want to build web sites enriched with sound and animation.

Help menus have been designed to guide users through creating web sites from the ground up, and to advise on estimated download times so users don't build bandwidth-busting web sites. Additionally, there are online guides to putting web pages on to a server and out to the internet.

Peak doesn't like to call WebBuilder an HTML editor, but rather, a tool for creating "state-of-the-art multimedia".

WebPage Builder will run on any platform that supports Java, and, like many other packages, comes with web-site templates. Clipart galleries and Java applets can be dragged and dropped into a web page design.



A WebPage Builder beta, currently available on the Peak web site, is a stripped-down version for HTML experts to test. Peak claims that the final version will feature a full GUI, making it an easy-to-use package for general users. When WebPage Builder is released, it will cost around \$49.95. UK distribution details have not yet been announced.

● <http://www.peak-media.inter.net/>

Sony claims a first for browser

Sony has released what it claims is the world's first VRML 2.0 web browser including support for Java.

That very browser is available for download from Sony's web site.

● <http://vs.sony.co.jp/VS-E/vstop.html>

Java for Explorer 3.0

Those who have already downloaded Microsoft's Internet Explorer 3.0 have been impressed with its cool new features and interface. But one item missing from the list, which surprised many users, was full Java support.

Now a Java add-on is available from the Microsoft web site. Fully-integrated Java support is planned for the next version of Internet Explorer. Microsoft says that Version 4.0 will also feature a just-in-time Java compiler.

● www.microsoft.com/ie

Jamba means Java for all

Aimtech aims to bring Java to the masses with its release of Jamba, a visual tool for creating Java applets and applications.

Users do not need Java programming experience, as Jamba automatically writes and compiles Java in the background.

Jamba gives webmasters and designers the chance to build interactivity into sites, in

the shortest possible time. A point-and-click interface shields users from Java, but Jamba will still compile robust applications.

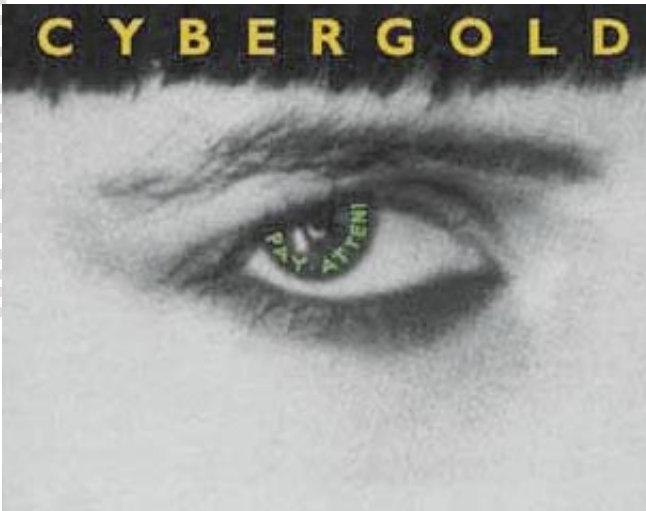
Available for Windows 95 and NT as a development tool, Jamba-created applets will run on any Java compatible platform.

Jamba costs around £319. A trial version is available for free download.

● www.aimtech.com



CUTTING EDGE



Take some credit for the number of web ads you view

Advertising on the web is still in its infancy. No evidence exists to prove whether anyone is affected by it or even looks at it. A new US development, the CyberGold online service, could turn the advertising world upside-down, by "paying" people to view web advertising.

CyberGold plans to reward those members who respond to interactive ads targeted at specific demographic groups. If

they respond to the ads, they will receive credits that can be exchanged for online time, T-shirts or new subscriptions.

The company, CyberGold, has been formed from the ashes of Kaleida Labs, the aborted Apple/IBM OS project. The former head of Kaleida, Nat Goldhaber, becomes the CEO of CyberGold. The offer is expected to go live in the autumn.

● www.cybergold.com

Virtual Passport control will benefit CompuServe users

Entering web sites is becoming more difficult as developers and businesses aim to lock users in, with fee payment and password control systems. If the new CompuServe Virtual Passport scheme takes off, people would be able to use their CompuServe password to gain access to sites throughout the world. They would no longer need multiple passwords.

By entering into agreements with CompuServe, commercial websites may be able to offer their members special deals and even waive subscription charges.

For webmasters and large site owners, it will enable specific logging of site visitors and demographics based on CompuServe's own information.

Smaller businesses will be able to set up a secure website, which could be open to CompuServe members only, allowing it to piggy-back on the global spread of membership.

"The Virtual Passport will allow users to carry the benefits of CompuServe membership across the internet," the company stated.

"Having one password will give users access to numerous websites, making the internet easier to use. For corporations and small businesses, the Virtual Passport means that they can now transform the global network into their own private network."

The technology uses Remote Passphrase Authentication (RPA) developed by CompuServe and described as a "shared secret" technology. In effect, passwords are not physically sent over the internet when entered into a dialogue box, as they are already authenticated by CompuServe.

Both Netscape and Microsoft web browsers already support the RPA standard.

● www.compuserve.com/rpa/index.htm

WebEx moves in for movers and shakers

The band of offline web readers has been swelled by the arrival of WebEx, designed for business people on the move. The idea is to download sites online from the internet or intranet, and then transfer them to laptops. They can then be browsed while away from the office.

Back at base, sites can be transferred to WebEx's integrated SurfBar and stored automatically. An automatic



dial-up facility can be set to download regularly-visited sites without having to manually open a web browser.

An index of Stored Sites allows users to see an exploded

view of sites. This enables them to target the exact information they need.

WebEx is from Traveling Software.

● www.travsoft.com

Navigator finds pole position

Netscape claims that Navigator, its web browser, is now the world's most popular software, with over 38 million users. And it is particularly pleased to note that it beats all three of Microsoft's Office applications.

Netscape does not make it clear whether the figure represents an installed base or download numbers. But despite this, few would dispute that Navigator is the world's favourite browser. Netscape currently holds about an 80 percent market share while Microsoft's Internet Explorer manages approximately seven percent.

● www.netscape.com

Net.surf



Slate chalks up issue No.1

The highly publicised new online journal edited by former hotshot Washington journalist, Michael Kinsley, is now up and ready. Slate is quite a departure for Microsoft, and is seen by some analysts as a way of testing the water before it launches fully into the content business.

Some believe it will fail. Criticisms have been levelled at Slate: it's unadventurous, and doesn't even begin to explore the possibilities of the new medium. Compared with advanced sites like HotWired or c/net, this is probably true.

Slate, however, has more in common with *The New Yorker* than *Wired*. Features are long by online standards, and it remains to be seen whether people are prepared to read such articles on-screen. Sites like Electronic Telegraph and WSJ.com succeed because of the brevity of their news stories.

But at a time when "exploring the new medium" tends to result in unreadable websites, Slate's traditional approach might not be a bad move.

The first edition of Slate ran to 38 pages. It certainly appears to be very much like a traditional magazine, both in layout and structure. It also has an extremely elegant design that looks as if the team behind MSN and Microsoft's corporate website had more than a hand in it.

For those who don't wish to read everything online, a printout in Word format is available. This version doesn't look so good, though. Surely an Acrobat version would have been a better idea now that Microsoft and Adobe are such good buddies?

Microsoft is promising an offline reading edition soon, which users will be able to download to their hard disks and read offline. An automatic scheduler for downloads is also on its way.

The first issue carried a bullish article from Steve Ballmer, extolling the virtues of Microsoft, which was probably inevitable. If Slate is to be taken seriously, it will have to gain independence from its owners, at least on computing matters.

Other features include Clinton's Drug War, and Jews in Second



Edited by Michael Kinsley, Slate is "more like the New Yorker than Wired"

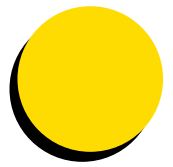
Place (an analysis of the changing social climate of Jewish America). A piece on Bob Dole simply confirms that Slate is strictly for US opinion-makers and intelligentsia.

Presently, Slate is free, but a billing system is being prepared for November and later. In the meantime, Slate has got to prove itself good enough to justify an

annual subscription of \$19.95. Although that is certainly cheap, compared with the cost of printed magazines, web users are reluctant to pay for what they tend to regard as being free by rights. If anyone can change this view, it will be Microsoft.

● www.slate.com





DIY 3D world-building

It's not just Java that's getting easier. Building your own 3D world on your website has become a realistic option with the release of Virtus 3-D Web Site Builder.

Developed for both Mac and Windows, the package is a drag-and-drop editor which builds 3D worlds based on the evolving VRML (Virtual Reality Modelling Language) standard. The graphical interface allows users to drag and drop ready-made VR objects and textures which, Virtus claims, will not result in huge file sizes.

A VRML browser is included in the box, but 3D worlds compatible with Netscape and Mosaic-based browsers can be created. These can be saved as helper applications or plug-ins. 3D WebSite builder is priced at £99.99 and is available now.

● www.virtus.com

What's in the pipeline for Pipex and Demon?


Following hard on the heels of Demon's 45Mb line access across the Atlantic, comes news of arch-rival Pipex, now part of UUNet, commissioning and testing its own equally fat pipe. Pipex expects the line to be functioning by the end of August.

Like Demon, UUNet hopes the line will improve transatlantic connections and speed up

download times on the web.

UUNet Pipex has also announced local call rate access to its service from 345 cities worldwide. The company claims this is the first time a European ISP has offered such a service in response to business demands.

Pipex was acquired by US-based UUNet in 1995.

● www.uunet.pipex.com 

net answers

Lost on the Internet?
Nigel Whitfield shows
you the way to go.



Download delays

Q. I have been online only for about four days, but I am having trouble achieving a reliable download from a local BBS. The logon procedure seems to go without any problems until I try to download anything using any of the available protocols (Zmodem and four different versions of Xmodem). The link appears to function correctly initially, but then begins to re-transmit large sections. After about 30Kb has been transferred, a) the computer crashes, b) the link simply disconnects, c) the transfer halts with no message or explanation, or d) the transfer information box disappears and the screen fills with garbage.

I have tried every combination of baud rates (down to 1,200), flow control and compression systems, but nothing seems to help. The longest file I have managed is 18Kb. Since this problem renders my connection to this BBS useless, I would be very grateful for any help.

A. There are a number of problems that can cause this. Normally, my first suggestion

would be to check the flow control, and ensure that everything works using the hardware flow control wherever possible. You can try connecting at very slow speeds, like 1,200bps with no flow control, to see if there's a problem. Don't forget to double-check options such as parity. With an internal modem, check all the hardware settings to make sure there's no clash with anything else. Sound cards can be culprits in modern machines, as they eat up lots of interrupts. A second avenue to explore is your telephone line. High-speed modems can be susceptible to interference. You may find that problems crop up where you have two phone lines. There may be "crosstalk" between them, which is a faint echo of one call on top of another, but problems of this nature will go away when you run the modem at a slower speed.

You should also check the other software running on your computer. Although that's not likely to be the problem here, it's a useful tip for other readers. Some memory managers can slow down the time it takes your computer to respond to

interrupts, and this can be critical for fast file transfers.

Next, try a different file transfer protocol. Forget X, Y and Z modem if you're having problems. Zmodem may be fast, but it needs a good connection to work. When I have problems transferring a file between two systems, one of my first options is to use Kermit. People think it's slow, but the latest versions can be fast and are certainly robust. It's available for nearly every type of computer on the planet, and handy to have in your comms armoury. Newer versions can be used to make Telnet connections over the internet, allowing you to download files from systems such as Cix and CompuServe that don't allow FTP access to their file libraries. The MSDOS version of Kermit, which will run in a DOS box under Windows, can be downloaded from

ftp.demon.co.uk in the directory

/pub/ibmpc/dos/apps/kermit.

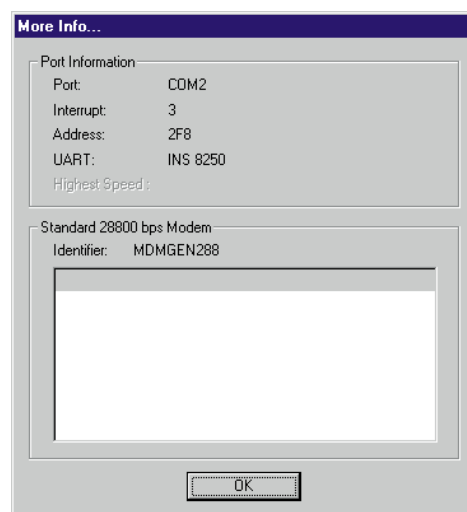
If all else fails, try a different modem. You don't say what model you have, or if your calls are all consecutive, but there have been widely-reported problems in the past with modems overheating and dropping connections as a result.

Unfortunately, it's not possible to give a definitive answer to your problem, but hopefully the issues that it's raised will help other readers track down their own gremlins.

Slow to catch on

Q. I read your column in the June issue of PCW with great interest, especially the Serial Port Speed Test. I have a 14,400 internal modem fitted to my PC but I can only connect at 9,600. If I run a higher speed, my password is not accepted.

CompuServe said it was a fault with my modem, so I ran the MSD program. Strangely,



The modem diagnostics, rather than the hardware properties, is where Windows 95 will tell you whether or not you do have a fast serial port in your PC (see "Slow to catch on")

after I have been online, I run MSD, and the baud rate for my modem (COM2) rises to 9,600. Why is this?

I have also been told that to run a modem higher than 9,600, you need some software which is available free on the internet. If this is true, why is this software not given free with all modems?

A. The reason that the speed of your modem changes after it's been used is simple. When the system starts up, the port will be initialised to a particular speed, which is usually 1,200. This may be different on some computers, especially if there's a MODE command in your autoexec.bat file.

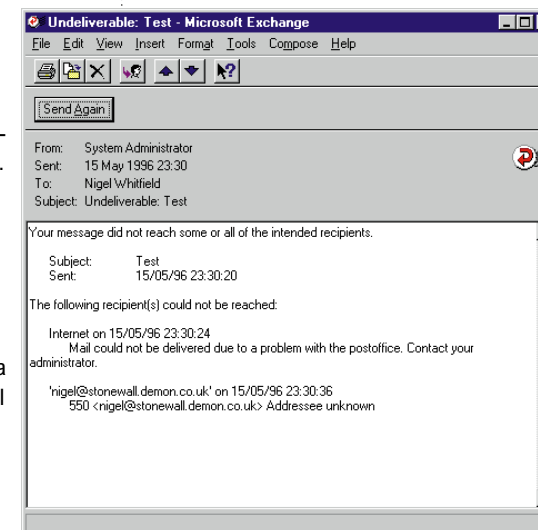
When you run the CompuServe Information Manager, it will initialise your modem port to the speed that you chose in the settings, which, in this case, is 9,600. It doesn't remember what the settings were beforehand, so they remain as WinCIM left them when you next check them with MSD. Some communications programs will restore the settings, but on a typical PC, there's no need to do that.

If you are having problems connecting at a higher speed than 14,400, there may be a problem with your phone line or modem. You could try using Windows Terminal to connect to CompuServe manually, to see if a connection can be made: this will help you find out whether or not the problem lies with your system or with CompuServe. If you haven't logged on to the service manually before, tell your modem to dial the usual number, press Enter when you're connected, type CIS, press Enter again, and enter your name and password.

You may be running into other problems. Although your modem runs at 14,400bps, you will need to set the serial port to 19,200, which is the next highest setting. On an old machine with other software running, this is where you may run into speed problems, which could cause information such as your password to be lost. Check the CompuServe setup to make sure that your modem is directly supported. If it's not, you'll have to resort to the manual and find the right command to add to the modem initialisation string to prevent the modem changing speed when it connects. Look for something like "speed buffering" or "lock serial port speed" and make sure it's turned on.

Finally, the answer to the last part of your question is "yes and no". To run a modem reliably at more than 9,600bps, you need a 16550A chip in your PC, as I've explained previously. That's not quite enough, because while the 16550 has a buffer to help prevent information being lost, it has to be enabled or it won't do anything.

There are a number of programs available that will do this, but your best bet is to enquire when you buy a fast serial card about software to complement it. Good comms software will also include a driver for the chip, and it's supported directly in Windows 95 and OS/2, so users of those operating systems won't need anything extra. In Windows 95, make sure that the "Use FIFO" box is checked in the modem setup properties.

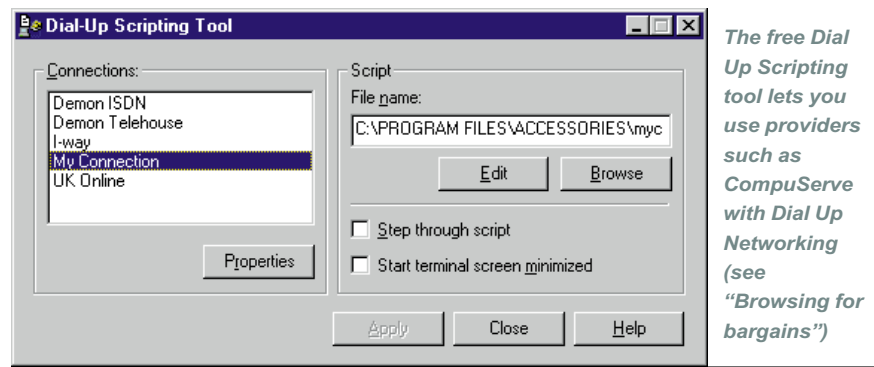


Exchange doesn't work very well over a dial-up internet connection. Messages will bounce if the phone is busy (see "On the rebound")

On the rebound

Q. I am using MS Exchange in Windows 95 to send email through my local IAP. When I use "Deliver Now" and the line is busy, the email bounces back as undeliverable and I have to "resend" it all. When I log on to the web, the Dial-Up Networking is set to redial five times before it fails. Can I configure my mail option to do the same, or at least to stop email bouncing back if the line is busy?

A. Unfortunately, MS Exchange is really designed to have a server on the network for your internet mail. If you want to send mail reliably from Exchange, you'll have to



The free Dial Up Scripting tool lets you use providers such as CompuServe with Dial Up Networking (see "Browsing for bargains")

ensure that you're connected to the internet before using the "Deliver now" option.

A better option is to use an alternative email program, like Eudora, which will queue messages properly, or Microsoft's own Internet Mail and News.

Reader required

Q. Is there any commercial software or shareware available which would allow a person to read an HTML page as if it were seen from a browser, without having a browser on their computer? In other words, an HTML "reader", a browser without all the comms bits.

I want to be able to copy a couple of my web pages, which have graphics and tables, on to a floppy disk to send to a friend. My friend does not have a browser and does not want to load a full-blown browser on to his system. An HTML reader, if such a thing exists, would be an ideal option.

I am sure that such a "reader" would be useful for many people. It would allow firms with established web pages to send their internet pages on floppy disks to those who are not connected. These people could then read them as if they were on the internet.

A. Strictly speaking, only a small part of the "communications bits" are included in the browser itself. Much of the communication is handled by winsock.dll on a PC. One result of this is that a reader wouldn't be that much smaller than a fully-fledged browser. Another is that many browsers will refuse to run if they can't find winsock. One solution is to download the smallest web browser you can find, as long as it provides all the features you need, and add a copy of "Nullsock", which does just enough to make the browser think you have winsock installed on your PC. Your friend can then load the first page using the Open File option in the browser, and once that's done,

most browsers will load other pages automatically when a link is clicked. Remember to use relative links (like "../index.html") rather than specifying full URLs, otherwise none of the links will work on disk.

Another option is to use a web-editing program, like PageMill, which allows you to load pages and view them as they appear in a browser. This isn't the cheapest solution, however.

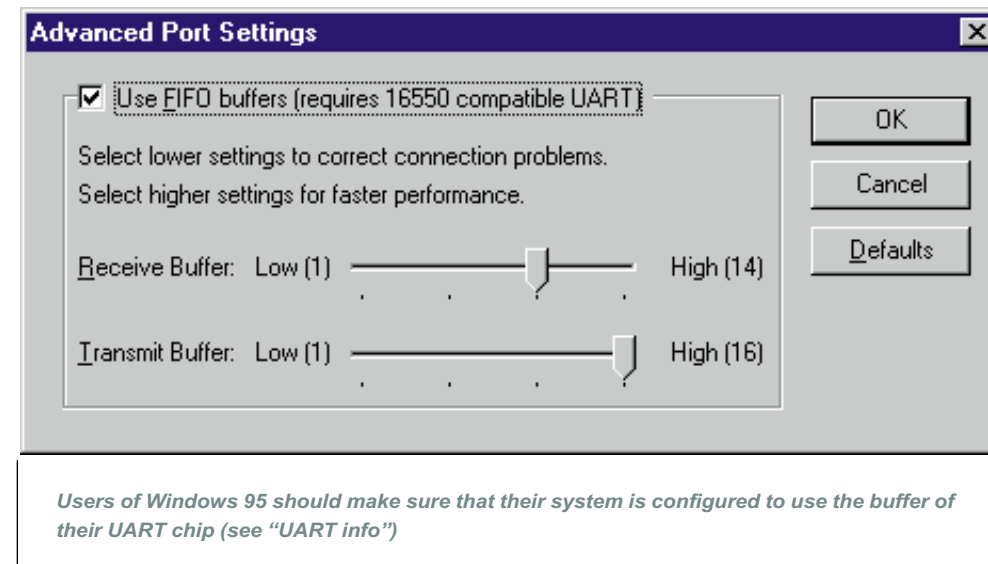
Browsing for bargains

Q. I am currently signed up to CompuServe and am using the latest SPRY Mosaic Browser. Having read articles that say how good Internet Explorer and Netscape are, I downloaded both and set them up.

Unfortunately, they both seem determined to use Windows 95 dial-up networking to connect to CompuServe. Having contacted both CompuServe and Microsoft, it appears I need something called DD Script, which is only available in the Plus Pack. Is there no way of getting the browsers to use the CompuServe Dialler or any plug-ins that come a little cheaper than £40 for the Plus Pack? I want to start using the top-end browsers with CompuServe, but is there a cheaper way of doing it?

A. The best solution is to use the Windows 95 dialup networking. Despite what CompuServe and Microsoft have told you, if you have the CD version of Windows 95 (the upgrade pack or the full version), you have everything you need to use CompuServe as an Internet provider via Dial Up Networking, which will then allow you to use whatever browser you like.

The tool you need to install is the Dialup Scripting tool, which is hidden away in the \admin\apptools\dscript directory of the Windows 95 CD-ROM. From the control panel, choose Add/Remove software, select Windows, then Have Disk and point to the directory. If you don't have the CD-ROM version of Windows, you can download the



Users of Windows 95 should make sure that their system is configured to use the buffer of their UART chip (see "UART info")

tool free of charge from <http://www.microsoft.com/windows/software/admintools.htm>. It comes with a script written for CompuServe, so you won't need to do anything more than create a dialup entry and associate it with the script. One CompuServe reader has already put together a tutorial, complete with screen grabs, which you can read at http://ourworld.compuServe.com/homepages/magister_ludi/ppp.htm.

How to take stock of share prices

Q. Living here in Saudi Arabia we have only limited access to the internet, or more specifically, email. No web sites for us expats. (Oh to access www.ft.com). Do you know of any company in the UK that provides, via email, daily updates of selected LSE stock prices and indices such as the FTSE All-share? I have encountered a couple in the US but they are robot-driven and I cannot get an

answer as to whether they provide LSE prices.

A. ESI will be able to help. Although, like most of the companies providing information on the internet, its service is based around the web, it does provide email services, including an option that will automatically alert you if your stocks move by more than a preset amount. The services all require a subscription, but the basic rates are reasonable. Information can be

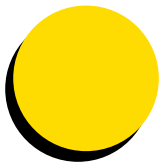
obtained via email to enquiries@esi.co.uk, or on the web at <http://www.esi.co.uk/>

UART info

Finally, thanks to the two readers who wrote in with the following snippet of information for users of Windows 95: *Just a quick note to let you know that you can find out what UART chip is supported in Windows 95. Open the Control Panel, click on Modems, then on Diagnostics, and select the port connecting your modem. Click on More Info and a diagnostic check will be performed, giving details about your modem including what UART chip is present.*

PCW Contacts

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THE EDGE

These pages are designed to be an easy-to-use reference guide to the Internet for the novice.

What is the Internet?

The Internet consists of millions of computers interconnected in a global network. The number of users is difficult to measure, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and growing.

What about this World Wide Web then?

It is *not* the Internet. It is a service on the Internet which uses special software known as Web Browsers (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. About 15 million people around the world have access to the World Wide Web.

Sounds great. What do I need to get on?

A PC of almost any age can be connected to the Internet as long as you can plug it into a modem. You don't even need to be able to view graphics on your machine to look around (although it helps).

A modem allows your PC to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2,400Kbps to more than ten times that. When you are using the Internet, the speed at which things work is more likely to be limited by the speed of your modem than by that of your computer. Buy the fastest you can afford. An old 2,400Kbps model is fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400Kbps is vital. Fortunately, these have



plummeted in price over the past few years and now cost as little as £100. If you have the money, go for a 28,800Kbps V.34 modem. Over time, you'll recoup the added cost by reducing your phone bills.

Okay, I've got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a "service provider" comes in — you have to subscribe to one if you want to get online.

Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company.

The bigger service providers will have the numbers you dial, PoPs (points of presence), scattered across the country so you only have to dial a local number.

If there's no company near to your home which offers Internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn't matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone numbers is available in the panel below. For more details, have a look at the supplement which was banded with the January issue of PCW.

Full Internet access, which

net.newbies

Getting started on the Net: what to do, where to go

allows you to use email and Internet services for any amount of time, limited only by the size of your potential phone bill, costs more, currently between £8.50 and £15 per month. There are dozens of companies offering this kind of Internet access, none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer a more personal service or a better selection of access software.

Why don't I just join CompuServe?

Or you could try AOL, Europe Online, UK Online and MSN who all now offer Internet access and also have a large number of services of their own to which only their subscribers have access. These services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £5 and £10 per month, plus a charge per hour if you are online for more than a set number of hours in that month. But as the market becomes more competitive, prices continue to fall.

Demon Internet is the best known and most popular of the standard Internet operators and is certainly more newbie-friendly than it used to be. Perhaps

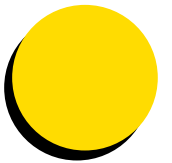
better for the raw newbie is Easynet or UK Online. The latter is a special case; a cross between an Internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the Internet, partially "censored" to make it safer for children to browse, plus access to online magazines and other services.

Any good service provider should provide you with appropriate access software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

- AOL** 0171 385 9404
- CompuServe** 0800 289378
email: 70006.101@csi.compuserve.com
- Delphi** 0171 757 7080
email: uk@delphi.com
- Demon** 0181 371 1000
email: internet@demon.net
email: sales@demon.net
- Easynet** 0171 209 0990
- Europe Online**
0171 447 3400
- Global Internet**
0181 957 1003
email: info@globalnet.co.uk
- UK Online** 01749 333333
email: sales@ukonline.co.uk
- If you don't understand what's written here or have any suggestions, please let us know. Contact **Paul_Fisher@pcw.ccmail.compuserve.com**, or "snailmail" (Internet-speak for the post) to the PCW Editorial address on page 12.





Innovations

Hi-society

A new organisation, with support from Japan, is championing a High Quality Audio Disc as a super-fi version of the DVD.

THE DIGITAL VERSATILE Disk (DVD), with its capability to put huge amounts of different data types on a single disc, is now just around the corner. But the audio industry (for which, after all, the CD was invented) is getting excited about the possibility of using the high density disc as a super-audio (and audio only) carrier.

Within DVD-Video there is already the capability to store multi-channel sound: eight channels or more, if you really want. So, in theory at least, you could use DVD-Video disks for multi-channel audio only, simply by not recording any video on them — although this would mean wasting all that data space reserved for the pictures. But this doesn't suit the audio world anyway. While audiophiles tend to be dismissive of anything that needs more than two speakers, it's not their main objection to using the audio track format of DVD-Video disc for music.

The problem arises with the MPEG or Dolby AC3 data compression systems that it uses. While each system has a potentially wider dynamic range and frequency response than ordinary CD, both are "lossy" compression systems — the audio world's equivalent of JPEG compression. And, like JPEG, there is a measurable and perceptible difference between the digital original and the encoded copy: a loss of quality. The

audio specialists are looking for a format that can improve entirely on the existing capability of an audio carrier, rather than diminish it.

Several organisations are pushing for a new standard for audio CDs. They all use the DVD's extra capacity to extend the quality of the recorded sound, but each with their own, often radically different, variants. Although there are commercial interests at play, what is driving much of the discussion is which way digital audio should go from here once it has been freed of the 16-bit 44.1kHz limitations of ordinary stereo CD. Since high-density CDs won't play on ordinary hi-fi and Walkman CD players anyway, this is an opportunity to develop a completely new, albeit non-compatible, audio CD format.

A new organisation, the Acoustic Renaissance for Audio (ARA), has come up with a set of proposals with considerable support in Japan. The ARA is filing a broad-ranging set of options under the banner of HQAD (High Quality Audio Disc). It aims to use the extra capacity to extend the dynamic range, resolution and frequency response of a hi-fi system. Many high-quality studio recording systems have already moved up from the 16-bit PCM audio standard that is used for digital CD audio, to 20-, 22- or even 24-bit recording. The additional word

length for each audio sample means an increase in dynamic range and a reduction in background noise. This is, in itself, worth having, but more importantly, high bit-rate recordings produce fewer errors when recording very low or very high audio signals, so generating a better-sounding recording overall.

Audio CD uses a sampling rate of 44.1kHz which is, annoyingly, slightly under the 48kHz sampling rate used by the broadcast world. The first option for HQAD is to bring the sampling rate up to 48kHz, which will make life easier, especially for those who are producing material for both CD release and broadcast or video use. It also extends the frequency response a little further into the 20kHz region.

A second super-quality variant using a 96kHz sampling rate is also on the cards, which extends the reproducible frequency response beyond 40kHz.

Although few can hear sounds even at 20kHz, high bit-rate recording has a knock-on effect on the overall sound quality. The higher sampling rate allows the signals you can hear (and their overtones) to be more accurately reproduced.

The format on offer by the

ARA supports a range of options including a stereo-plus-six-channel-surround option, either in expectation of a revival of "quadraphonic" or to include discrete multichannel movie soundtracks.

Even with the DVD's extended data-carrying capacity, there isn't enough space for this amount of pure PCM signals, so the standard uses lossless data compression; much the same as used on hard-disk compression. The whole thing can be

produced on a mix-and-match basis, with the HQAD CD's producers deciding their own particular mix of quality, number of tracks and playing time. This will range from nearly six hours of stereo 16-bit 48kHz audio, down to two and a half hours of stereo 24-bit 96kHz material, or back to 74 minutes (the playing time of a normal CD) for eight channels of 16-bit, high sample-rate, surround sound.

When the super-fi standard is eventually agreed upon (the expected date is 1998) there will be nothing to stop DVD-ROM drives being fitted with suitable decoder cards to extract high-definition audio. Who knows: perhaps in the near future we may see hi-fi magazines reviewing PCs alongside their most esoteric CD components.

Tim Frost

“Several organisations are pushing for a new standard for audio CDs”

Horizons

Give the dog an MBone

Media moguls are making waves about sending video entertainment and information across the internet to selected audiences.

SENDING VIDEO SIGNALS over the net initially seems a pointless exercise. After all, we have a perfectly good way of sending video across the world. It's called TV. It's fast. Millions can watch it at the same time, it doesn't crash, and you don't have to wait for it to download.

But TV is a passive broadcast medium that cannot yet be targeted precisely at key audiences. What is getting some media moguls excited is an internet technology that does precisely that: imagine if they could send video entertainment and information to selected audiences on a subscription basis.

The MBone is a phrase you are likely to be hearing more of in the next few years. MBone stands for "multicast backbone" and was originally developed to enable geeks to talk to each other across the internet, simply by using their workstations and special software downloadable from the internet.

A multicast transmission sends audio and video signals from a single point (a single UNIX workstation) to a limited number of receiver points, twenty, say. For example, an engineering lab in Cambridge might want to set up a video-conference link with partners in

Bristol, London and Edinburgh. By using the MBone they can send the pictures across the internet to those selected parties only, using the special MBone addressing system, similar to that used for normal IP internet transactions.

To date, the MBone has been used only selectively. The most commercial example was a Rolling Stones concert broadcast live in 1995. As an experiment it worked, but was viewed mostly by computer engineers getting their rocks off on UNIX workstations.

The MBone has been developed from experiments conducted by the Internet Engineering Task Force (IETF) and based on work done at Xerox PARC. Originally, the MBONE was conceived as an IP multi-

cast network to carry IETF test transmissions entirely supported by volunteer efforts. But like the internet itself, it seems

you can't keep an engineering solution secret for long.

Although the MBone works as a network, it is in fact a virtual network which sits on top of the IP-based internet itself and is comprised of "islands" that support the IP multicast protocol. These "islands" are linked by

"tunnels", at the end of which sit UNIX boxes which have a specially-configured daemon that supports the MBone.

It sounds great; but in the age of bandwidth restrictions, it will come as no surprise to learn that only around 10 percent of internet users have PCs powerful enough, and enough bandwidth, to receive MBone transmissions.

So why bother? For one thing, proprietary video-conferencing systems cost a fortune, as do the call charges. In the US, at least users of the MBone can video-conference for free across the internet without investing in new hardware.

The other reason is the dream of on-line interactive TV which doesn't use the TV networks. If vendors can send video signals across the network, at broadcast quality, it will open up the media, and sooner or later the bandwidth problem will be solved. A multicast network means that thousands of independent multicast companies could target exactly those people they want to, which could include political supporters, software buyers and other specific consumer target groups subscribing to dedicated MBone channels.

But none of this will happen until enough people have the power and bandwidth to receive MBone transmissions. Currently

the only people who can use the MBone are those with Unix boxes and preferably at least a T1 link — pretty much the same people who once had the internet to themselves.

It all depends on bandwidth. If that can be cracked, then the MBone and schemes like it may offer real commercial potential. If not, then subscription TV such as that proposed by Rupert Murdoch in the UK may be the way forward, but that still depends on conventional broadcast technology and receiving equipment. The dream of sending interactive TV over digital phone lines is one that many, including Microsoft, hope to realise.

In San Francisco, another experimental network has been set up called the BAGnet (Bay Area Gigabit Network) which is able to transmit full-motion interactive video over the internet using fibre-optic lines.

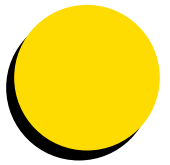
Despite the current limitations of the Internet, which was never intended to carry video signals in the first place, it seems people won't stop trying to do it. And the consumer may benefit in the long term.

Joe Young 

"MBone and schemes like it may offer real commercial potential"

PCW Contacts

Home page
<http://www.best.com/~prince/techinfo/what-is-mbone.html>



There is nothing inherently electrical about computing. In conventional computers, 0s and 1s are represented by the presence or absence of particular voltage levels, but some machines have been built using technologies as diverse as fluid flow or beams of light. Researchers seeking the ultimate in miniaturisation are now investigating the use of individual sub-atomic particles. The possibilities are as astonishing as they are powerful. Prepare to have your mind boggled by the Quantum Mechanical computer.

We expect things around us to possess certain definite properties, whether or not we're actually observing those properties. Suppose I set a spinning-top going. If I asked you to tell me whether it was spinning clockwise or anticlockwise, you would need to examine it. You would find that it spins the same way all the time and that it would spin that way whether you were looking at it or not.

Now consider a sub-atomic particle such as an electron, spinning about an axis. We would expect that at any time, like the spinning-top, the particle must be in one of two states, either spinning clockwise or anticlockwise.

Not so, according to the laws of Quantum Mechanics, the physics which describes the



The quantum computer would change the world of IT as we know it. But will it ever become a reality?

sense, simultaneously spinning in both directions!

Such weird behaviour would seem to rule out using the particle to represent a binary digit, but there is a surprising advantage lurking here. Let's say that our "quantum bit", or "qubit", represents a 0 if it is found to spin clockwise, and a 1 if anticlockwise. Now, imagine that we excite the qubit with suitable laser light, such that its spin is an equally probable superposition of clockwise (0) and anticlockwise (1).

Imagine further that we take, say, 32 of these qubits and assemble them side by side to make a register. In a conventional computer, a 32-bit register can store a single number in the range 0 to $2^{32}-1$.

Because each of our qubits is in a superposition of 0 and 1, each

parallelism on a massive scale for free, from just a single register. There must be a catch here, you're thinking.

There is. Although the register contains a superposition of all the results of the computation, to examine the register we must perform a measurement on each qubit, which then becomes either 0 or 1. We are left with a single 32-bit number, chosen at random from all the results of the computation. It would appear that we haven't gained anything. Although four billion computations have been performed at once, we see the result of only one, and a randomly-chosen one at that.

However, there are mathematical algorithms which involve performing computations just like this, therefore ideally suited to quantum parallelism. Peter Shor, of AT&T Bell Labs, has

the Internet. According to Shor, a quantum computer would find the answer in a few seconds.

This has an important implication for public-key cryptography, which depends for its security on the practical computational impossibility of factoring numbers with around 250 digits. Public-key cryptography is currently considered unbreakable, and therefore widely used in financial and military systems, as well as in the Pretty Good Privacy (PGP) program which is popular with Internet users. With Shor's factorisation algorithm running on even a simple quantum computer, all the world's secure cryptography might disappear overnight.

For now, quantum computers exist only on paper, and there remain formidable theoretical and engineering barriers to their

**"A 1994 experiment to factor a 129-digit number took eight months of solid computation...
A quantum computer would find the answer in a few seconds"**

micro-world. Until we actually make a measurement of the particle's spin, it has no definite spin at all. Rather, it is in a "superposition" of its two possible spin states. All we can say is that there is some probability that its spin, when measured, will turn out to be clockwise or anticlockwise. Until the measurement is made, the particle is, in some bizarre

one of the four billion possible integers between 0 and $2^{32}-1$ is somehow "simultaneously present" in the register.

Now comes the clincher. If we perform a computation (such as "add one") on the register, the computation will actually be performed simultaneously on all the possible numbers in it, leaving the register containing all the corresponding results. We get

devised such an algorithm for finding the factors of large numbers. Even the fastest known conventional factorisation methods are so compute-intensive that the problem is effectively unsolvable on the largest modern computers. A 1994 experiment to factor a 129-digit number took eight months of solid computation using 1,600 co-operating workstations on

construction. But perhaps the technology will eventually arrive on our desktops. Accompanied, no doubt, by a copy of Personal Quantum Computer World.

Toby Howard

PCW Contacts

Toby Howard teaches at the University of Manchester and edits *The Skeptic* magazine.

Retro

Windows with bells on

Windows 3.0 may seem clunky now, yet six years ago it was a vast improvement over previous versions and started the bandwagon rolling.

WINDOWS 3.0 "MAY YET stave off the UNIX challenge". This was the conclusion of the review in the July 1990 issue of *PCW* which looked at the new version of the Microsoft front-end to DOS. It seems remarkable that Windows has been around six years, as long as the 486; but then, it's equally remarkable how much has changed since then.

At the time, we commented on how OS/2 wasn't a viable option because it needed too much RAM (6Mb), but Windows 3.0 could run on a 286 (or an 8086 in real mode) with 1Mb.

Windows 3.0 represented a huge improvement over previous versions. You no longer had to re-install Windows when you changed the mouse (back then, plug and play was for Macs only) and it multitasked programs, providing a viable alternative to DesqView. With the vast majority of software being DOS-based, this was an important requirement.

There were great accessory programs, too: a solitaire card game and Reversi, both of which proved far too addictive (Solitaire has made it all the way to Win95 and NT 3.51). The paint program even allowed colour editing of images.

The terminal program was smart enough to know which COM ports were available, and the file manager was an easy way to navigate the directory structure, although we noted that it was a little slow because it read the whole disk directory each time you logged on to a disk.

The control panel in Windows 3.0, which allowed the configuration of the whole system to be altered, was a major boon: you could even have more than one printer installed at a time, and all your applications would use the same driver.



At the time, Windows was seen as a way to save disk space. New applications, freed of the need to include printer drivers with each program, would only need a couple of floppies. Back in 1990, CD-ROM was quite a specialist area, and 650Mb was a mind-boggling amount of space.

Conversely, one of the major problems was a lack of applications. It was said at the time that Windows wouldn't be credible until the major programs (WordPerfect, WordStar, dBase and Lotus 1-2-3) were available for Windows 3.0. But history took a different course, and the rise of Windows allowed Microsoft to become a major applications company, with Word and Excel.

Superbase was the database option (not that there was much

choice) and Microsoft was a late player in the database market. Conspiracy theorists claim that Microsoft deliberately wrong-footed Lotus to give Excel a break, but given the size of Microsoft's task in getting Windows 3.0 established, this is just vacuous Microsoft-bashing. The job of getting Windows 3.0 established was big enough without Microsoft having to dissuade key developers.

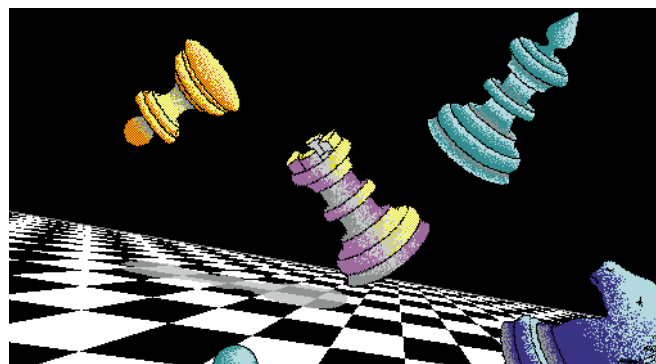
Looking back, Windows 3.0 seems ancient, clunky and painful. Lots of things didn't work properly and you had to edit config.sys, autoexec.bat and win.ini files to get applications working (particularly DOS games). Sound was limited to a simple beep; networking wasn't built in and so was re-named "networking".

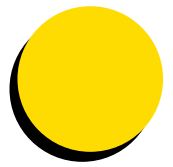
The review in *PCW* didn't even mention that Windows 3.0 used co-operative rather than pre-emptive multitasking. Yet despite the cries of Macintosh, Amiga and Archimedes owners that "we got there first", the Windows bandwagon was rolling. We compared Windows 3.0 with GEM and DesqView, and came to the conclusion that it was better but rather slow, especially compared with DesqView, but that its ability to run programs bigger than 640Kb made it nevertheless worthwhile.

We got some points wrong. Chiefly, the belief that Asymetrix Toolbook was *the* killer application. This was a scripting language for Windows calls, which provided a quick way to knock up Windows applications. Our faith in it was partly due to the investment in Asymetrix by Paul Allen, Bill Gates' partner in Microsoft, but mainly down to the success of Hypercard on the Macintosh which, at the time, was being used for a huge variety of applications. We also believed that the Calculator was bug-free and that the Recorder would be widely used.

However, in the main we got it right, and did so in an issue graced by what I consider to have been one of the best-ever *PCW* covers.

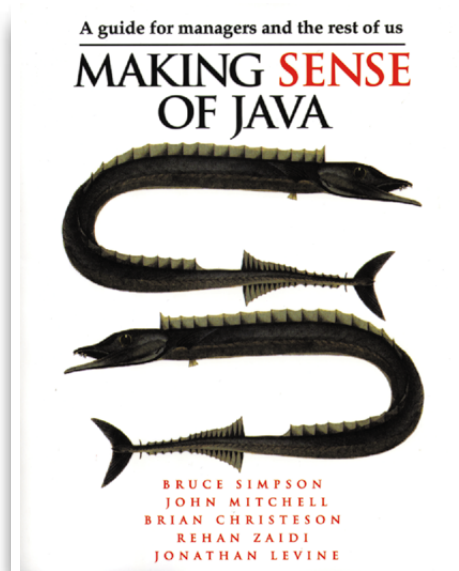
Simon Rockman





BOOKS

This month's pick of the PCW bookshelf.



Making Sense Of Java

Hyped or not, Java is beginning to make the move from being a cool idea to being a real application. At least one fully-fledged program is being written entirely in Java, which underlines the fact that Java is above all a programming language. A recent Java conference in America was reported to have been hugely over-subscribed. Like it or not, it looks like Java is here to stay.

This is why MIS managers and those with a professional interest in computing at any level are starting to feel that perhaps they should find out about this Java stuff.

Making Sense Of Java is a good start. It is a non-technical overview, exploring what Java is, where it came from, how it compares to competing technologies and where it is likely to go. I say likely, because no-one can really be sure right now. There is still time for Java to implode into JAPL (Just Another Programming Language).

However, the authors of this book have their minds pretty much made up, claiming, "It's

an odds-on bet that the introduction of Java ... will be pivotal in determining the direction of the whole computer industry".

Whatever your opinion, there is no harm in finding out more and this book certainly gives you a clear idea of the potential of Java. You can read it in an afternoon and, although expen-

sive for a mere 150 pages, it is a better bet for many people than most of the Java "bibles" currently available.

PJ Fisher

Making Sense of Java

Authors Bruce Simpson, John Mitchell et al
Publisher Manning Publications
ISBN 1-884777-24-4
Price £18.95
Rating

Designing For The Web

This is probably the first book on

designing for the web that I have seen which seems to have been written from a designer's point of view. It doesn't ignore HTML, as that would be impossible, but puts the emphasis on design. Decide what you want to do, realise the limitations of web design, like graphics and screen resolutions, and design using HTML to make the best of these limitations.

While the web is creating opportunities for people who have little or no design experience, akin to the DTP revolution of the eighties, more opportunities exist for those who already use PCs; especially those who create more traditional print-based design.

The book introduces the web and the fractured nature of web browsers, which is currently the biggest obstacle facing web designers. Making your design look good on all browsers is a point this book makes well and often. Full marks there.

The best chapters cover the different types of image compression and which ones to use for different web graphics. Information on bit-depth should be nothing new to designers used to using PCs, but it is

presented clearly for those who are new to the technology.

Overall, this is a fine guide to web design and would make an excellent companion to packages such as Adobe PageMill or Microsoft Front Page.

PJ Fisher

Designing for the Web

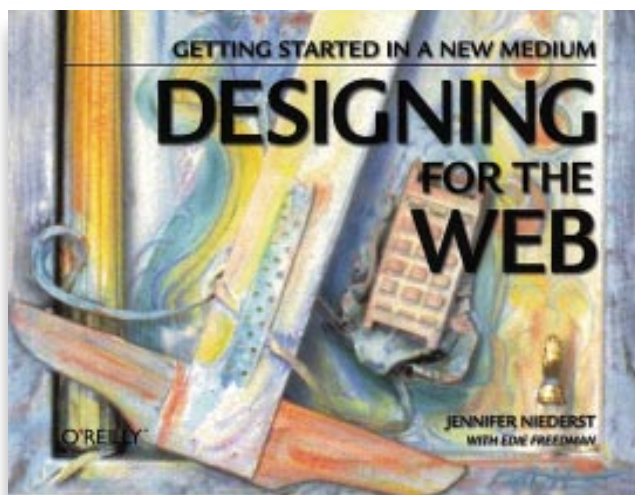
Author Jennifer Niederst
Publisher O'Reilly
ISBN 1-56592-165-8
Price £11.95
Rating

Agents Unleashed

Just in case you're not fluent in modern technobabble, an "agent" is one of those super-intelligent creatures which flies around the information super-highway, picking up nuggets of data which it thinks you will find useful. Peter Wayner, in his book *Agents Unleashed*, attempts to explain how agent technology can work to your benefit in the real world.

The first chapter begins with a surreal film script in which James Bond, cunningly named "Bondo", saves the Washington McDonalds building from terrorist threat. Bondo is in Cannes at the time racing his speedboat but, with the aid of his waterproof portable, a cellular wristwatch phone and several software agents, he is able to access the restaurant's central computer and turn all its appliances up to full blast. Many cunning tricks and controls later, disaster is averted and Bondo is back winning the boat race!

This book is not a work of fiction, but a serious attempt at illustrating how software agents can actually be put to practical use. The overblown first chapter is used to show that intelligent agents are more than querying




tools. They are able to seek out relevant data on a worldwide scale, and reveal relationships and patterns which are targeted to our special needs.

Wayner explores how the agent concept might work in varying degrees of complexity. But this is not just a theoretical book: the nitty-gritty of implementation is also dealt with. How, for example, will the agent move around the world from network to network? Problems of security and privacy are involved, as well as difficulties with resource allocation on queried databases. Wayner deals with each of these implementation problems, showing how to build your own agent software in various languages including LISP, XLISP and TCL. In each case, the limitations of the language are studied with reference to their effectiveness as tools for creating agent software.

This is a thoroughly researched but extremely specialised book. If you're interested in the hardcore elements of agent technology and you like playing with code, Wayner's book will give you plenty to think about. A disk of sample code is also included.

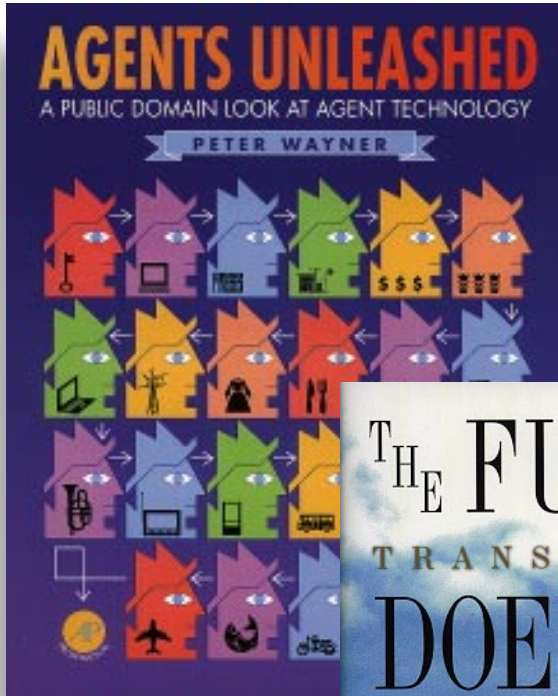
Eleanor Turton-Hill

Agents Unleashed

Author Peter Wayner
Publisher AP Professional
ISBN 0-12-738765-X
Price £29.95
Rating 

The Future Does Not Compute: Transcending the Machines in our Midst

This book is a deeply philosophical examination of the effects of technology, especially the net,



on human beings and their interaction with each other. His argument, which lends itself to the academic realm, is well supported by his bibliography, but tends to be let down by his pleading for more humanity and less technology.

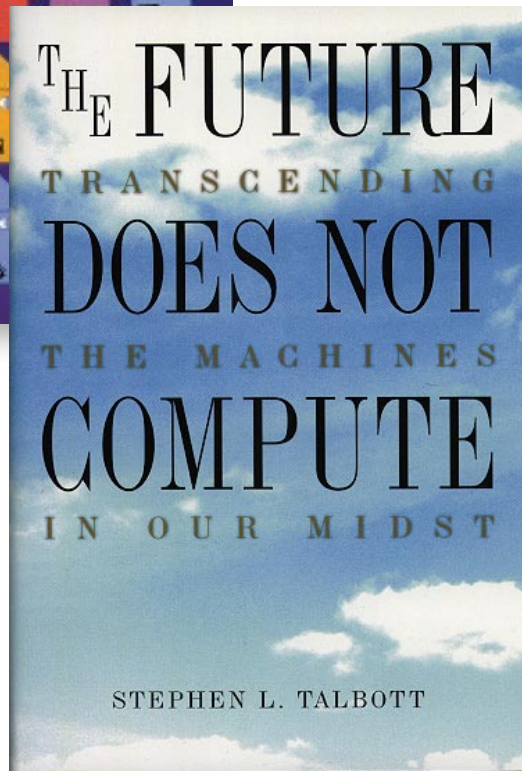
The thrust of Talbott's argument boils down to a singular message: computers bad, man good. Talk of man embracing the self-

created technological assault and humanity's submission to it bleats on and on. His particular focus is on the net and its current and potential effects upon society, particularly children. With more and more exposure to soulless

Some of what Talbott says is valid. Like TV, the net can disassociate people from one another. Instead of talking to your work partner, you might opt to email them a memo; kids will play video games rather than do homework. These are becoming universal facts. His fear of people being removed and isolated from a sense of community is a real possibility, but I can't buy the whole argument.

Talbott's intentions are worthy, particularly when he states, "We must come to ourselves — experience an awakening of what's most deeply human within us." But I couldn't help but feel his argument was a Luddite-like plea for a return to the good old days: make it go away and everything will be okay. That's not going to happen; but if you want to sensitise yourself to humanity, then turn off that PC and read this book. It will make you think.

Dylan Armbrust



The Future Does Not Compute: Transcending the Machines in Our Midst

Author Stephen L Talbott
Publisher O'Reilly &

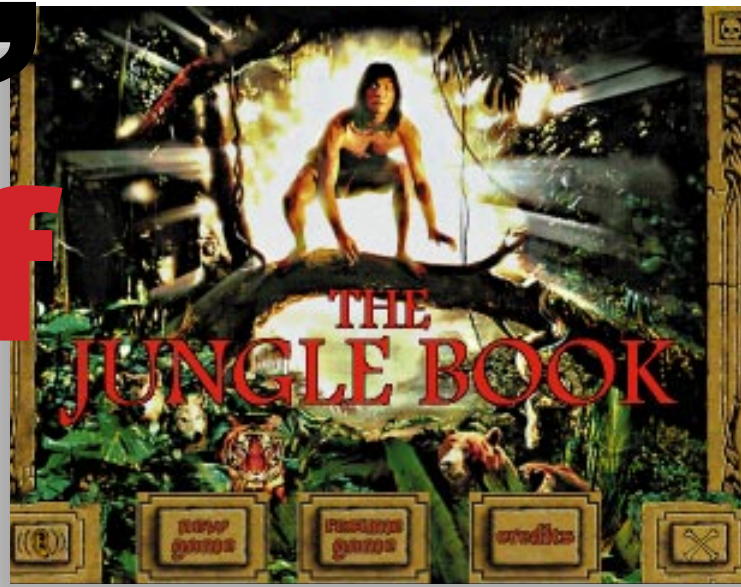
Associates
ISBN 1-5692-085-6
Price £16.95
Rating 

Top Ten Books: September 1996

1	Java in a Nutshell: Desktop Quick Reference	O'Reilly	£10.95
2	HTML: Definitive Guide	O'Reilly	£20.50
3	Core Java: SunSoft Java Series (Book/CD-ROM)	Prentice-Hall	£32.95
4	CGI Programming on the World Wide Web	O'Reilly	£26.00
5	UK CompuServe Book (Book/CD-ROM)	TekBooks	£19.95
6	More Effective C++	Addison-Wesley	£22.95
7	The Essential Distributed Objects Survival Guide	Wiley	£24.95
8	Programming Windows 95 (Book/CD-ROM)	Microsoft Press	£46.99
9	Visual Basic Programmer's Guide to Win32 API (Book/CD-ROM)	Ziff-Davis	£46.99
10	Hitchhiker's Guide to Visual Basic & SQL Server (Book/CD-ROM)	Microsoft Press	£41.99

List provided by the PC Bookshop, 11 & 21 Sicilian Avenue, London WC1A 2HQ.
Tel: 0171 831 0022. Fax 0171 831 0443

Kids' Stuff



Strange lands, strange people: meet the Bloats and The Great Rabbitini. Is Veggie Valley in veggie heaven? Can you make a pizza for a Troll? Paul Begg has the answers.

MUCH SUPERB SOFTWARE has come the way of *Kids' Stuff* this month, with several titles coming from companies noted for quality, such as Broderbund and Disney.

Timon and Pumbaa's Jungle Games

This was launched last May to coincide with the release of the video "Around the World With Timon and Pumbaa". In case you didn't know, Timon, a meerkat, and Pumbaa,

a wart-hog, are two characters from "The Lion King" movie. It deserves a special mention as it is Disney's first venture into games. And very good it is, too.

There are five games: Jungle Pinball, Hippo Hop, Slingshooter, Burper, and Bug

Drop, none of which are particularly original. Pinball is self-explanatory. Burper and Bug Drop are variations on the old Space Invaders arcade game and Tetris. They will probably be new to young children and the Disney animation helps to make them special. Children will certainly enjoy them.

One of the reasons why Timon and Pumbaa is so good is that Disney collaborated with games developer 7th Level. The combination of Disney's animation (there are 10,000 Disney cels used in these games) and 7th Level's technical skills has produced a real winner.

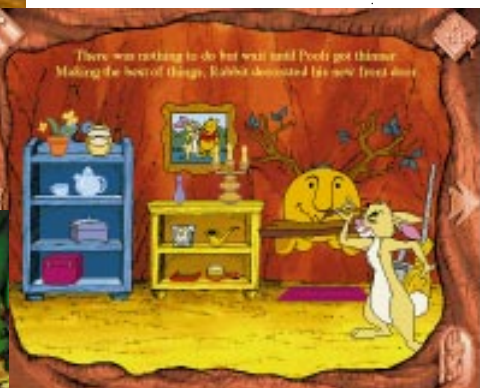
I look forward to the next result of their collaboration; namely, a game based on the new Disney movie, *The Hunchback of Notre Dame*.

Winnie the Pooh and the Honey Tree

Due to be in the shops in September, the UK release coincides with the 30th anniversary of the film of the same name.

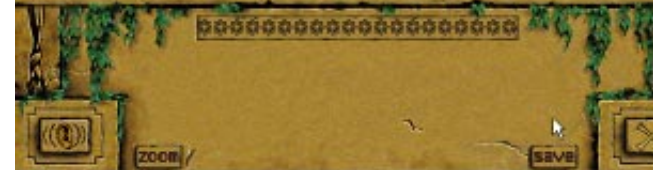
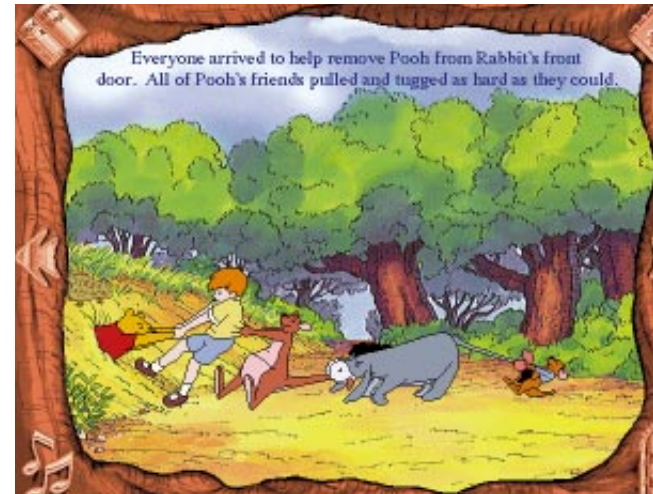
Disney has laid such a claim to Pooh, Christopher Robin and friends in the Hundred Acre Wood, that you could be forgiven for thinking the company invented the characters. The Pooh cartoons are charming, and for many children Disney's Pooh is Pooh.

The movies were marked by super animation, exceptional voice characterisations and some nice songs. Winnie the



Left *Timon and Pumbaa's Jungle Games*. Great graphics lift games like pinball out of the ordinary

Above *Winnie the Pooh and the Honey Tree*. Pooh Bear gets cheeky but Rabbit puts a brave face on it



Above left *Winnie the Pooh and the Honey Tree*. Saving Pooh from getting a bad name
Left *Jungle Book Moviegame*. Colonel Ilgwoom gives you all the help you need
Above *The Logical Journey of the Zoombinis*. The Zoombinis queue up, ready to get away from it all

Pooh and the Honey Tree on CD-ROM, one of the Disney Animated Storybooks, is an almost direct lift from the film. All the voices and the songs are there and the same high-quality animation, with the advantage of interactivity. There are plenty of hotspots on each screen, a dictionary to explain some of the more difficult words, and some games to help teach co-ordination skills.

The Honey Tree is a smashing story. Pooh visits Rabbit and eats so much honey that he gets stuck in Rabbit's "front door" and has to remain half in and half out of the rabbit hole until he gets thinner. And there's that great scene where Rabbit, dismayed at having Pooh's posterior gracing his living room, decides to decorate it and make it a feature!

It's great fun. I reckon young children will love it, especially if they already have the video. After all, who isn't a Pooh fan?

My only complaint is the price. It is inevitable that one compares the CD-ROM price with the price of the book or video and, in so doing, I think £40 is an awful lot to pay for a children's animated storybook, even a really good one. A price drop is badly needed.

Jungle Book Moviegame

Continuing the movie theme is IBM's *Jungle Book Moviegame*. The game itself involves King Louie's magic crown, which has been stolen. Your mission is to find it and restore order to the jungle. Apart from the gameplay, there's over 100 minutes of live-action video from the visually-stunning live-action Disney feature starring Jason Scott Lee.

Designed for children aged between five and nine years old, you assume a starring role, facing many dangers while venturing through the jungle, choosing paths or collecting tools to help in your efforts to reach Monkey

City and find King Louie's crown. To help you on your way, you have Colonel Ilgwoom, a talkative chimpanzee called La Tee, and the spirit of Mowgli, the orphaned child who was raised by wolves. All of them give you assistance and advice.

You must learn the language of the jungle, having to repeat the howl of a wolf or the chatter of a chimpanzee to progress. One of the main features of the game is that it is voice-activated via a small microphone which comes with the CD-ROM. Actually, the game comes on two CDs. If you don't want to use the microphone, you can still progress through the game by solving puzzles. There are skill levels from Junior to Expert.

The game is fairly demanding on system requirements. A 66MHz 486DX with 8Mb of RAM is the recommended minimum, and you will need 10Mb of hard disk space. Nevertheless, it is fun to play and exceptional to look at.

I look forward to the next *Moviegame* product, which will be *Pinocchio*, a preview of which is on the *Jungle Book CD*.

The Logical Journey of the Zoombinis

Any of the aforementioned titles could have been the best disc of the month, had it not been for *The Logical Journey of the Zoombinis*, which put everything else in the shade and is absolutely brilliant.

What's it all about? Well, the *Zoombinis* are happy people, who all look a little bit different from each other. Their island is invaded and conquered by the evil Bloats, who among other things give the *Zoombinis* a lot of homework. The result is that the *Zoombinis* decide to break for freedom, flee their island and make new homes in a distant land. But they need a guide to solve the assorted problems they encounter on their journey, and that's you, or any child aged eight and upwards.

The problem-solving aspect is *Zoombinis' raison d'être*. There are 12 puzzles, each with four levels, which introduce important mathematical skills and concepts and, above all, logical thinking. It is difficult to describe in a few words how it does this, but one example is the

File Level Sound Puzzles



Above *Playskool Puzzles.* This mix-and-match construction worker won't be whistling while he works

Right *I Can Do Magic.* Watch out for the orange surprise trick: it could destroy packs of playing cards!



Pizza Troll. You have to work out the correct combination of toppings to produce the Troll's favourite pizza. After a few "free" attempts, you begin to lose Zoombinis if you fail. No, they don't get killed, just sent back to the start of the game and this can be bad news later on, as you can't progress with fewer than 16 of the little people.

The Logical Journey of the Zoombinis links with all the Key Stages in the National Curriculum and is probably the best piece of educational software I have seen in a long time.

Mr Potato Head Saves Veggie Valley

Playskool is a name you will have seen often enough as you've wandered around the toy stores, even though you may not have immediately associated it with a specific product. The company makes Play-Doh, Tonka trucks and Mr Potato Head. It has now branched out into software and applied its half-century of educational toy-making experience to producing well-designed games for children.

Mr Potato Head Saves Veggie Valley is a learning game for three- to seven-year-olds.

Veggie Valley has been struck by a drought and Mr Potato Head and his daughter, Sweet Potato, have to reach the Country Fair, capture a big rain cloud and bring it back to the Valley.

Your child's job is to guide Mr Potato Head and help him succeed in his quest. You collect objects during your journey and solve various problems. This may not sound much, but the game is graced with a certain charm, nice characters and fun music. It will also entertain younger children and fulfil learning objectives.

Of course, Mr Potato Head wouldn't be Mr Potato Head if you couldn't dress him up. The CD provides plenty of opportunities to do just that, and you can print out the results in either black-and-white or colour.

Playskool Puzzles

Siobán and I also looked at the fun-filled Playskool Puzzles, for children aged three to six years old. The games are simple yet entertaining. We both spent a lot of time with the mix-and-match game, creating mismatches like a construction worker with a dummy in his mouth.



Other games include a Jigsaw, a simple game called Explore It in which you have to put objects back into a picture, and Connect the Dots. When you have created a picture, you can change the colours and other details using a simple paint program. The finished masterpieces can be printed and it's great fun for younger children.

I Can Do Magic

Almost every child I know delights in magic and likes to perform simple magic tricks. It's especially good when they can

genuinely baffle their parents and friends.

CD-ROM provides a good medium for teaching tricks. A book can't show you a trick step-by-step as successfully, and with a video you could be spooling back and forth forever before finding the trick you're looking for. With a CD-ROM you can quickly find the trick you want, and see it repeated until you understand it perfectly.

We have looked at several magic tutors in Kids' Stuff in the past and were eager to get the chance to play with IMSI's I Can Do Magic. Unfortunately, it seemed to miss the mark at almost every level.

For instance, the tricks are demonstrated by a model rabbit called The Great Rabbitini. This would be great for small children, but may prove too babyish for older ones. I Can Do Magic is targeted at seven-year-olds and upwards. Many tricks require preparation which a small child simply couldn't cope with alone, including cutting paper with precision, and gluing. I'm especially dubious of magic

tricks involving long pins and boxes of live matches. Surely this is a recipe for disaster?

Day-to-day magic should be simple, with no necessary or complicated preparation before performance, and it shouldn't be expensive. Many of the tricks here are "stage tricks" — that is, tricks which involve preparation, props, and quite sophisticated performance skills. One trick involves cutting a small section from an orange, which is no mean trick in itself, inserting a playing card and replacing the original section, to give the impression of an untouched orange. In addition, each performance of the trick involves the destruction of two packs of playing cards!

The tricks are clever and, with a lot of practise, will certainly astound mum, dad and friends. There's a quick and simple guide to the history of magic, short biographies of some celebrated magicians of the past, and a Magic Resource Guide telling you about magic publications, magic-trick equipment suppliers and even magic sites

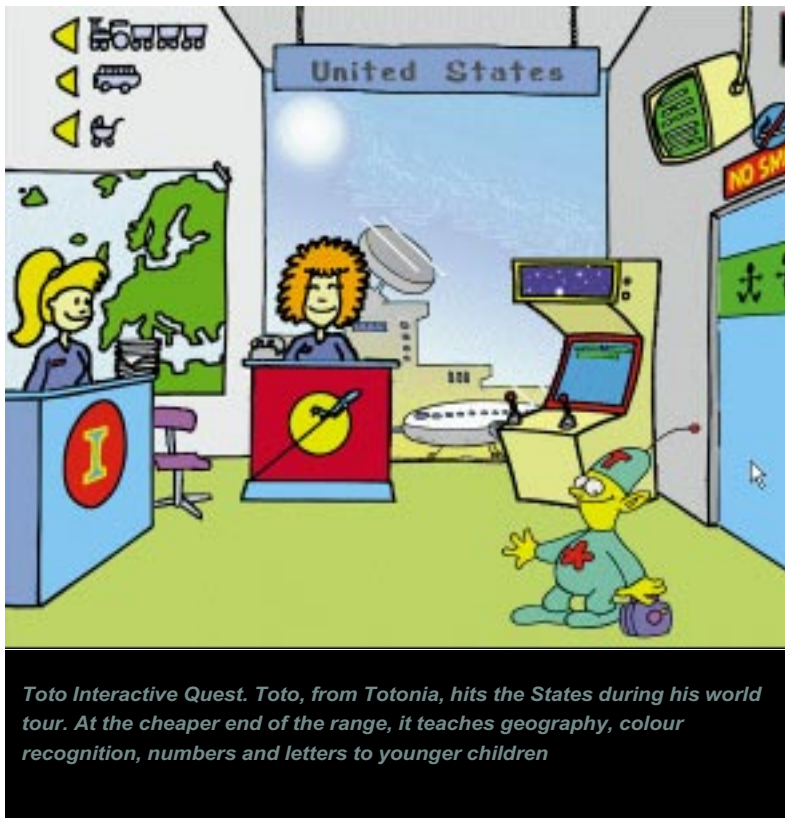
on the internet. The upbeat narration is brilliant and the animation is of a good quality. The price, too, is quite attractive.

Toto Interactive Quest

Finally, a quick mention for Toto Interactive Quest. After all the great animation of the Disney discs, the bells and whistles of the Jungle Book and the educational thought that had been put into Zoombinis, Toto Interactive Quest rather brought me back to earth with a bump.

Aimed at children aged three to 13, its lack of sophistication and extremely basic animation is unlikely to appeal to the upper end of the suggested age range. Young children, though, might find Toto both charming and educational.

Briefly, Toto is a creature from the planet Totonia who visits Earth and accompanies you on a trip around the world. Each location teaches a little about travel and geography, but there are also games to help your child acquire skills such as colour recognition, numbers, letters and animals.



Toto Interactive Quest. Toto, from Totonia, hits the States during his world tour. At the cheaper end of the range, it teaches geography, colour recognition, numbers and letters to younger children

It was nice, but not that nice. Nevertheless, its charm grows on you, so if you get the chance to look at it in your local computer store, do so. Every child being different, yours might reject the glitz of other packages and delight in the simplicity of Toto. And maybe I wouldn't disagree with that. You can't really complain about the price. It's worth looking at.

PCW Details

Timon and Pumbaa's Jungle Games

Price £39.99
Contact Disney Interactive
Tel 0171 605 2738
Rating ★★★★★

Winnie the Pooh and the Honey Tree

Price £39.99
Contact Disney Interactive
Tel 0171 605 2738
Rating ★★★★★

Jungle Book Moviegame

Price £35
Contact IBM
Tel 01329 242728
Rating ★★★★★

The Logical Journey of the Zoombinis

Price £30
Contact Broderbund
Tel 01429 273029
Rating ★★★★★

Mr Potato Head Saves Veggie Valley

Price £19.99
Contact Hasbro Interactive
Tel 0181 569 1234
Rating ★★★★★

Playskool Puzzles

Price £19.99
Contact Hasbro Interactive
Tel 0181 569 1234
Rating ★★★★★

I Can Do Magic

Price £24.95
Contact IMSI
Tel 0181 581 2000
Rating ★★☆☆☆

Toto Interactive Quest

Price £12.50
Contact Interactive Ideas
Tel 0181 447 9288
Rating ★★★☆☆

CD-ROMs

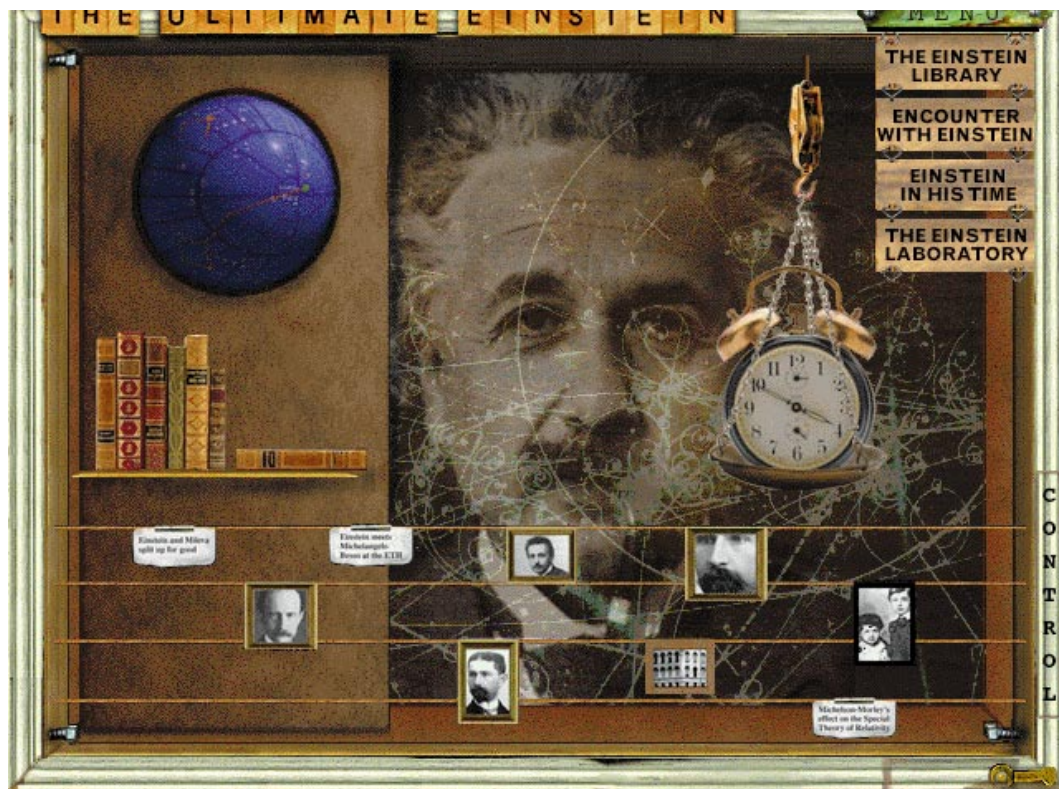
Get familiar with the man who gave us the theory of relativity, enjoy some close encounters with strange phenomena and mysterious beings, and brush up your French. Anyone planning a trip to New York, or about to embark on a spot of treasure hunting, should start here.

The Ultimate Einstein

Born in 1879 in Germany, Albert Einstein didn't talk until he was three years old. In school he was such a poor pupil that his teachers refused to recommend him for a university place. He was forced to work as a relief teacher and later as an examiner in the Swiss Patent Office in Bern.

In fact, Einstein was a genius who, when only twelve years old, taught himself Euclidean geometry. He privately devoted himself to physics and in 1905 published several papers. The third of these contained what became known as the special theory of relativity. By 1913 he had been appointed director of the Kaiser Wilhelm Institute for Physics in Berlin and was gaining wider notoriety, particularly after winning the Nobel Prize for Physics in 1921.

After World War I he became the victim of vicious attacks by anti-Semitic and right-wing elements in Germany. When Hitler came to power in 1933, Einstein emigrated to the United States. Seeing clearly the threat posed by Hitler, he abandoned his belief in pacifism, but his continued support of Zionism led to him being offered the presidency of Israel, which he declined. He died on 18 April, 1955. He was probably the most famous scientist in the world.



The Ultimate Einstein explores every facet of his life, career and theories. There are four sections, each of which is subdivided. The Einstein Library contains three books: *Einstein: The Life and Times*, by Ronald W. Clarke; *Ideas and Opinions*, and *Autobiographical Notes* by Einstein. There's a radio interview with Einstein on the day he became an American citizen.

A section called Einstein in His Time is a time line broken into five categories: Home Life, Politics and Philosophy, Career, Science, and Historical Context.

Another, called the Einstein Laboratory, provides easy-to-understand explanations of Einstein's most important theories. The weakest segment is Encounter With Einstein, where an actor portrays Einstein and expresses some of his thoughts on a range of subjects, from classical literature to human rights. It's just a gimmick.

If you have a modem and internet access you can log on to The Ultimate Einstein web site. However, you can't copy from the CD to incorporate the text in

From school dunce to genius of world renown: discover the life, times and theories of the world's most famous scientist

study notes or insert passages into essays. Otherwise, this is a fascinating exploration of Einstein's life and work.

Paul Begg

The Ultimate Einstein
Contact Macmillan Interactive Publishing 0171 881 8304
Price £39.99 (incl. VAT)
Rating ●●●○○



The Unexplained

Flagtower calls itself the originator of the "interactive documentary" format. Its products can be used in two ways. You can either take a back seat to let the documentary roll through like on TV, or determine the direction you take and the depth to which you explore each subject.

In the past, you could have accused Flagtower products of being turgid. They were made with schools in mind but, when popularity began to grow, Flagtower saw the potential of more mainstream topics. History of Medicine launched the change in direction and now there's The Unexplained, which is anything but turgid.

With the cult following of the X-Files and the hype about the Roswell Incident, it's surprising that the multimedia market hasn't been flooded with spooky CDs. As it is, this is the first we've seen.

Instead of focusing on areas of cult interest, it spans diverse subjects including crop circles, timeslips, psychokinesis and spontaneous combustion. It will interest just about anybody.

The Flagtower interface is

Ghosts, ghouls and things that go bump in the night. Anything without a logical explanation is revealed here



standard throughout the range. It is unimposing, with few fancy bits to distract you. This is good if you want to let the program roll through, but if you want to interact, it's a bit dull. Having said that, the motion is smooth, the graphics are good and the animation sequences which launch each section are impressive. A clever function in the program is the ability to flash between text and pictures, just by moving your mouse. This CD has a soundtrack written specially for it, comprising suitably mysterious music.

The CD is divided into sections: strange phenomena, earth mysteries, beyond science,

UFOs and ufology, ghosts and spirits, and mysterious beings.

Each section has subsections and chapters. Mysterious Beings examines vampires, werewolves, wild things and angels. You can learn about Peter Stubbe, the world's most infamous werewolf, who murdered his daughter and sister. If you really want to be horrified, read how he killed his son and ate his brain.

"Kidnapped by a UFO snatch squad" caught my attention, as did a story in the Coincidences chapter. A man in Bermuda was knocked off his moped and killed by a taxi. Now, you may think this is just hard luck, but exactly a year later, the deceased's brother was riding the same moped down the same street and was killed by the same taxi carrying the same passenger. It's a shame it was a few years ago, when Mulder and Scully were mere twinkles in

their parents' eyes. Imagine the fun they could have had with that.

Rachel Spooner

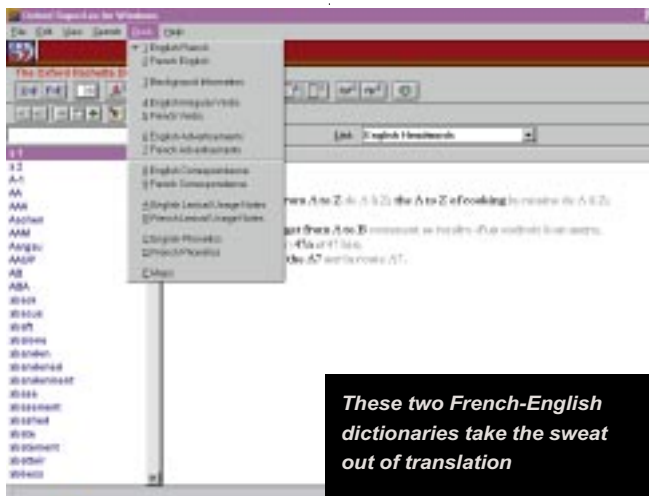
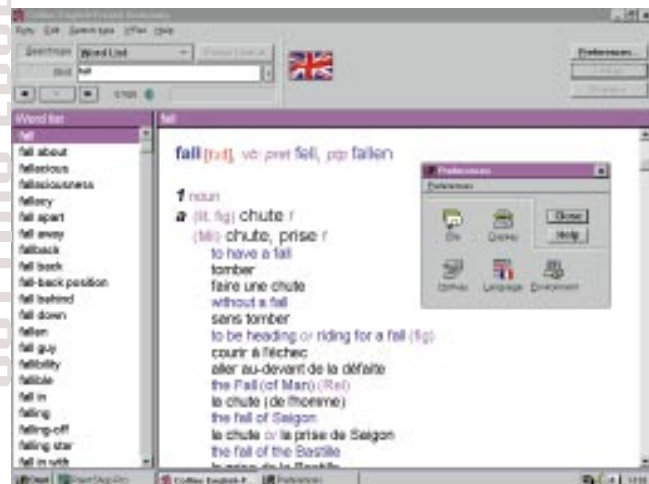
The Unexplained
Contact Flagtower 0500 486500
Price £29.99
Rating ●●●○○

Collins French and Oxford Hachette French Dictionaries

Anyone who has ever picked up a bilingual dictionary will know they are not exactly featherweight or portable. And with that amount of paper, finding what you are looking for takes time. Harraps has had its French/English dictionary available in electronic form for some time, but this is the first outing on CD for both Collins and Oxford.

There are two main features you want from a bi-lingual dictionary: ease-of-use, and high-quality entries. From a subjective standpoint, I prefer the content of the Collins. It is not afraid to confuse the reader by offering numerous translations of one word, so it's slightly more realistic in its suggestions of the most common usages. The Oxford Hachette looks as if

CUTTING EDGE



These two French-English dictionaries take the sweat out of translation

it has more entries, with 350,000 words compared to only 300,000 in the Collins, but it doesn't. It just organises them in a different way.

The search facilities on both are quick and simple. To be truly useful, any CD dictionary must be easy on the eye, and here again, the Collins is the better of the two. The Oxford looks a little too much like the paper version. There are some separate entries, but all the examples are lumped together in one paragraph. It differentiates the languages with bold and light italicised typefaces, so it's not so easy to scan quickly. The Collins, on the other hand, uses more colours and lists each example on a separate line.

The Oxford has a couple of advantages. It adds a macro to your word processor, so it can be called directly from any document you are working on. The Collins is supposed to do this,

but failed to do so on setup. Secondly, the Oxford has entries on irregular verbs, correspondence, phonetics and lexical usage. Some of these are of limited interest, but others, such as the section on irregular verbs, are invaluable.

The Oxford is the cheaper option and is good for students up to 'A' Level standard, but the Collins wins overall as the more sophisticated product.

Adele Dyer

- Oxford Hachette French Dictionary**
Contact OUP 01865 267979
Price £49.99
Rating ●●●●○
- Collins French Dictionary**
Contact HarperCollins 01903 873555
Price £64.63
Rating ●●●●●



Lost Treasures

This CD-ROM is no more likely to lead you to wealth beyond your wildest dreams than your numbers in the National Lottery next Saturday, but the CD conjures up more magic than Mystic Meg. Imagine yourself hacking through the undergrowth on a remote and uninhabited Caribbean island in search of the lost treasure of Captain Kidd. Or on horseback trekking through the Superstition Mountains in search of the fabled Lost Dutchman Mine.

This title is full of solid material and worth the money, although in these days of dramatically falling prices, £40 is quite pricey. It contains everything the novice treasure hunter will ever need. You can meet your host, Stan Grist, complete with an Indiana Jones hat, and learn about his career as an explorer and private detective.

You can discover how the skills and knowledge honed in the latter career, along with the surveillance equipment used, have been employed in treasure hunting. You will learn about all the

Dig deep to find that buried treasure



aspects of treasure hunting, from panning for gold, like a prospector of the California gold rush, to research into the law and ethics of the subject. There are some smashing narrated tours of famous treasure tales such as the Lost Dutchman Mine, and stories about famous treasure hunters. There is a good bibliography of various treasure-hunting books and a selection of maps.

The heart of the CD is the listing of 5,000 treasures. Here you can search for stories by category, such as type of treasure, location, or value. Don't waste time on measly little treasures worth only hundreds of thousands of pounds. Go for the big stuff like the one hundred million dollar treasure of Henry Christophe, the so-called Black King of Haiti, who is reputed to have buried his fortune in gold on one of the pinhead islands of the Bahamas. But which one?

Overall, Lost Treasures is an excellent introduction to the fascinating world of treasure hunting. At half the price, I'd say "rush out and buy it", but forty quid makes you stop and think a bit.

Paul Begg

- Lost Treasures**
Contact Macmillan Interactive Publishing 0171 881 8304
Price £39.99 (incl. VAT)
Rating ●●●●●



Frommer's 96: New York City

This is the first guide book we have seen that comes with a CD-ROM. The idea is not that you should wander around the streets of Manhattan with your multimedia notebook running, but that you should look at it to decide where you want to go beforehand. On the day, take the book with you, or even just the included map.

The CD-ROM includes all the information in the book, but supplements it with plenty of photos and videos. The advantages are obvious. You get to see what you are going to visit before you get there. If you

don't have a lot of time, it makes sense to suss out what is really your cup of tea before you embark on the trip. So for the walks around Manhattan, there are pictures of most of the sights along the way. The videos are also priceless for giving you a good idea of the feel of the place.

The guide itself is comprehensive. It covers the sights, accommodation, dining out, nightlife, the basics of getting about, and all those extra little bits of information which are equally important, such as how to get there and how to stay healthy and safe.

The whole thing is well-



Well-designed, snappy and entertaining: use this guide to work out your route around New York before you get there

designed, snappy and entertaining, and makes planning your trip a more pleasant experience.

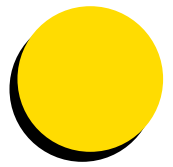
Adele Dyer

- Frommer's 96: New York City**
Contact Prentice Hall 01442 882058
Price £29.95 / Rating ●●●●●

Top Ten CD-ROMs July 1996

1	The Unexplained	Flagtower
2	Organic Art	Warners
3	Star Wars Trilogy	Acclaim
4	Discover Astronomy	Maris
5	3D Interior Design	Europress
6	Cinemanía 96	Microsoft
7	Incident at Roswell	Omnimedia
8	Print Artist	Sierra
9	Ultimate Encyclopedia of Soccer	Electronic Arts
10	Windows 95	Microsoft

Chart courtesy of HMV Games / LEVEL ONE



NEWS

Screenplay

Microsoft moves in on the games market

While console competitors Sony and Sega fight it out in a price war, Microsoft (MS) continues to muscle in on the games market.

Almost a dozen action, simulation, sports and strategy games are lined up for release. They all aim to use DirectPlay and Direct3D APIs for

multiplayer gaming and realistic graphics.

One of these, Hellbender, is the action shooter sequel to Fury³. Equipped with your Hellbender aircraft, you must stop the resurgence of the evil Bion forces and the impending uprising. There are many secret worlds and hidden

objects to discover. You can fly above the ground, or within it by diving into vast caverns. Using AVI clips a sci-fi storyline is added, with a mysterious voiceover during gameplay.

Another new game is Deadly Tide, a high-speed underwater action thriller set in the year 2500AD. Not only does it feature stunning 3D graphics created by Amblin Imaging, the animators behind SeaQuest

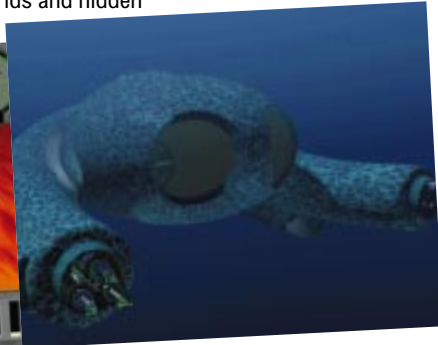
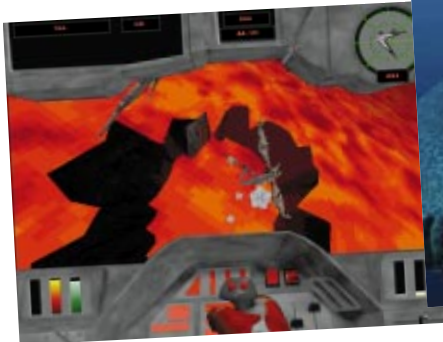
and Star Trek:TNG, but there's also 3D sound technology with panoramic viewing and movement, offering a full 360 degrees in some parts of the game.

MS is also launching the SideWinder gamepad. Similar in shape to Bandai's Pippin controller and with controls bearing a striking resemblance to Sega's Saturn, it could become popular as arcade-style games strike out into the PC market.

Game customiser software is bundled to let you program complex, multibutton tactical moves into a single stroke, to help defeat your enemy.

The RRP is £69.99 (incl. VAT).

Microsoft
0345 002000



Hellbender and Deadly Tide, two of the games being launched by Microsoft

Charts



1	Championship Manager 2 (CD)	Domark
2	Settlers 2 (CD)	Blue Byte
3	Civilization 2 (CD)	Microprose
4	Duke Nukem 3D (CD)	US Gold
5	Dogz (CD)	Mindscape
6	Command and Conquer (CD)	Virgin
7	Warcraft 2 (CD)	Zabrac
8	Euro Championships '96	Gremlin
9	AH-64D Longbow (CD)	EA
10	Command and Conquer: Covert Ops (CD)	Virgin
11	Worms Reinforcements (CD)	Ocean
12	Theme Park Classics (CD)	EA
13	Nascar - White Label (CD)	Virgin
14	Championship Manager 2 Italia (CD)	Domark
15	Star Trek Klingon (CD)	Ocean
16	FIFA '96 (CD)	EA
17	Syndicate Classics (CD)	EA
18	Warcraft 2: Beyond Dark Portal (CD)	Zabrac
19	Day of the Tentacle (CD)	US Gold
20	Sam and Max Hit the Road (CD)	Virgin

Improve your game

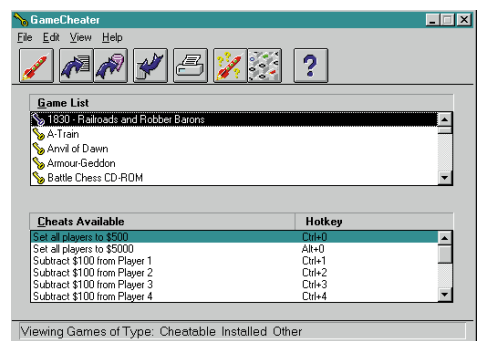
GameRunner3 is a game accelerator providing fast access, memory enhancements and "secret" advantages. It includes DOS memory management support from QEMM 8 memory management software and comes with Cache86, a disk cache/accelerator.

Game enhancement modules (GEMs), otherwise known as cheats, can be used on selected games and contain hints to assure players of triumph, supply-

ing you with features such as invincibility and unlimited ammunition.

GameRunner is designed to support both Windows and DOS. It retails at a recommended price of £29.95 (plus VAT).

Quarterdeck 01245 496699



Quake

Release September • Contact GT Interactive 0171 258 3791

Yes, it's here. Will it be doom and gloom for Doom?

Prepare to be shocked — Quake has finally arrived. The shareware version of Id Software's official successor to Doom is now available for download from the company's Internet site at www.idsoftware.com.

You'll have to wait until next month's Screenplay for a full review, though. Until then, here's a quick preview of what's to come.

Chief among Quake's plus points are an all-new graphics engine, with support for multiple resolutions, up to 1280 x 1024 pixels, and state-of-the-art texture mapping. The rendering is so advanced that the game requires a Pentium processor, or equivalent, to run. Support for 3D graphics accelerators is planned for the final version



Quake features a horde of new monsters, including this rather evil-looking ogre (above). Your weapons range from the basic axe, to the Thunderbolt. The detail in Quake is better than Doom; when you zap a monster (below), you can see the bullet holes!



Actua Sports Euro 96

Price £29.99 • Contact Gremlin Interactive 0114 275 3423 www.gremlin.com

Probably the only way England will beat the Germans at the beautiful game.

Football briefly came home but, sadly, left again. Writing this review the day after England were knocked out of the Euro 96 championship was probably not the best idea, but this Euro 96 game is every bit as good as the original Actua Soccer, from which it is derived.

The graphics are just as good, too. The players move across the pitch faster than a pack of Daily Mirror hacks in pursuit of a back-page cliché. The specially-rendered versions of English football grounds do look like Old Trafford, Anfield, Wembley and the rest. You get those different views of the game that made Actua Soccer so outstanding, and the attention to



detail now extends to Vic Reeves-style goal celebrations.

Once again, Barry Davies has trousered a handsome fee to supply his 30,000-word specially-recorded commentary. The Actua version of Barry is somewhat more entertaining than the real thing.

Different teams have been programmed to play differently, so you get a harder game against the Dutch than the Swiss. Hang on: shouldn't that be the other way round?



Football is coming home... to your PC screen, courtesy of Actua Sports Euro 96

If you want a slice of the best football game for the PC to relive Euro 96, then this is the one to aim for. What's more, you can replay England v Germany as many times as you like until England win.

PJ Fisher

System Requirements 486 DX2/66, 8Mb, SoundBlaster, 26Mb hard disk, VGA graphics
Price SRP £29.99 (incl. VAT)
Contact Gremlin Interactive 0114 2753423

Return of Arcade

Price £19.99 (incl. VAT) • Contact Microsoft 0345 002000

A trip down memory lane with Pac-Man, Dig-Dug, and other gems from the glorious past of computer games.

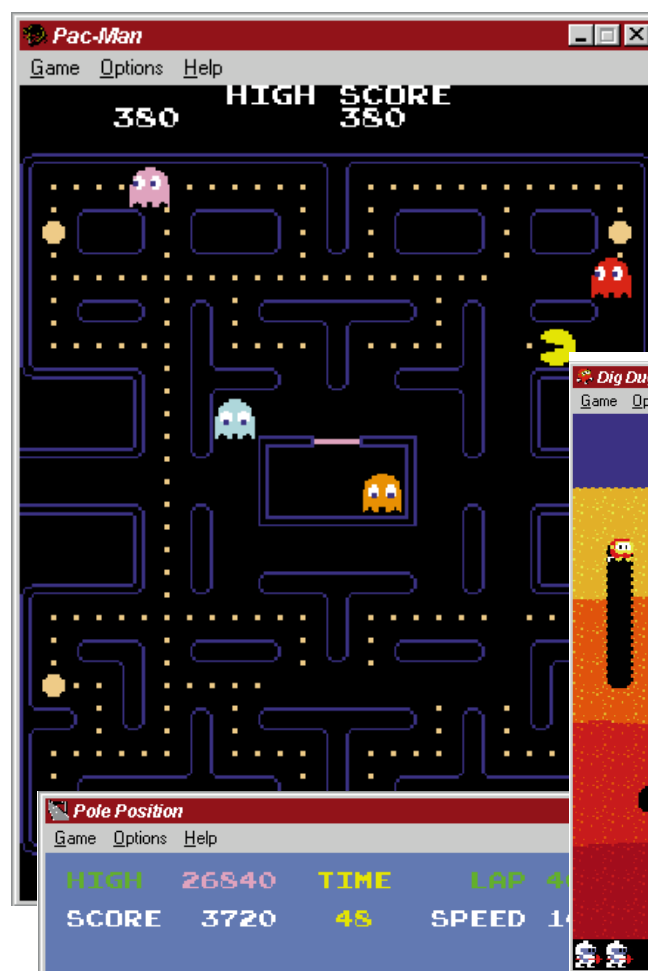
If your idea of a good game is more Donkey Kong than Doom, chances are that Microsoft's latest entertainment pack is for you. Following on from its earlier Arcade collection for Windows, Return to Arcade (RoA) brings four more all-time classic video games to the PC.

Designed specially for Windows 95, using DirectX technology, RoA features faithful conversions of Pac-Man, Dig-Dug, Galaxian and Pole Position. The graphics and sounds are just as bad as you remember them, and the gameplay is as addictive as ever.

For those not familiar with the heritage of computer games, Pac-Man is the original maze chase game. The idea is to gobble up dots in a maze while being pursued by a band of hungry ghosts — Inky, Blinky, Pinky and Clyde. Get caught by the ghoulies and you lose a life. Lose three lives and the game is over. To help Pac-Man, four "power pills" scattered on-screen allow him to do the chasing for a while.

Galaxian is just as straightforward, moving on one step from the original Space Invaders. Your ship fires missiles upwards at an advancing alien force, but this time the baddies have a range of varied attack patterns. To make things more interesting, the three shield barriers at the foot of the screen have been removed, leaving you wide open to attack.

Dig-Dug and Pole Position are just as simple to understand and get to grips with. The former has you running around in underground tunnels, blowing up monsters, while Pole Position lets you hurtle around in a Formula 1 Grand Prix race.



Nostalgia rules — revive a misspent youth or start from scratch with these blasts from the past, now available for Windows 95. Anti-clockwise (from top): Galaxian, Pac-Man, Pole Position and Dig Dug

Microsoft has clearly done its homework with Return to Arcade, and after playing each game for a couple of hours, it's

clear that they have stood the test of time. The conversions are accurate and each can be played in a window or full-screen, using

mouse or keyboard control.

If you fancy a quick blast from the past, look no further. For those who want the complete classic collection I can also recommend Arcade, which comprises Asteroids, BattleZone, Centipede, Missile Command and Tempest.

Chris Cain

System Requirements 486DX 33MHz or higher, 4Mb RAM, SVGA graphics, mouse, sound card, 3Mb hard disk
Price £19.99 (incl. VAT)
Contact Microsoft 0345 002000

Normality

Price SRP £44.99 (incl. VAT) ● Contact Gremlin 0114 2753423

Ever wondered whether you could enjoy a non-violent game after the likes of Doom? Try this for size.

Normality is a 3D point-and-click adventure, suitable for all ages. There's no violence, no strong language and no sex, but before those on the wrong side of political-correctness turn the page, stop and read on, because it's very good.

The game is not set in some fantastical world, inhabited by heinous and unrecognisable monsters: it's as close to normality as a computer game is likely to get. If you think *your* life is dull, take a trip to Neutropolis. Neutropolis was an exciting place until 30 years ago, when one of its twin leaders was killed. Now apathy is a way of life. The city is guarded by Norm Troopers, hell-bent on maintaining total boredom.

You take on the role of Kent, a "shameless dreamer" who is being punished by the authorities for whistling happily in public. Imprisoned in your flat for a week, with only the TV for "entertainment", you're so fed



Escape from Kent's flat, to save Neutropolis from total boredom

up that you decide to take action and make some changes.

The action involves exploring Neutropolis, picking up clues and solving puzzles *en route*. The first task is to escape from your flat and the vigilant Norms. You must look at everything, talk to everyone and collect all you can. Your rucksack has a limitless capacity, so take

advantage of it. To use something you've found, or to talk to someone, or to pick things up, you employ your voodoo doll.

I consulted the hints and tips section in the CD insert, as it helps you to get out of the flat

quickly, and get used to the bizarre humour and quirks of the game. You must learn to be resourceful: make deals with people and make friends. If someone asks you for a milky coffee, get them one. If there's no milk, use your initiative; you're not the one who's going to drink it.

To move around, you use a combination of keyboard strokes and the mouse. The motion as you walk is reminiscent of Doom. The graphics are authentic.

Normality's enjoyment stems from the fact that it's different in many ways to other games. There's no killing or maiming, and the most harmful thing you'll see is the inside of Kent's flat, which is disgusting. The plot is off-the-wall: original, humorous and likely to amuse for a long time. The visuals and the gameplay are both of a high quality.

Rachel Spooner

System Requirements

486/66MHz, 8Mb RAM, MS DOS 5.0, double-speed CD-ROM, SoundBlaster-compatible sound card, 20Mb available disk space
Price SRP £44.99 (incl. VAT)
Contact Gremlin 0114 2753423

Leisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie

Can you find a three-letter English word that contains neither a vowel nor the letter Y? The word appears in both Oxford and Chambers dictionaries. It is not an abbreviation, nor is it a name.

This Month's Prize Puzzle

This month's problem can be solved analytically, or you can use a number-crunching computer program to get the answer.

At a recent fund-raising event, three types of donors were targeted: high street retail shops (HSRS), local banks and building societies (LBBS), and other non-retail businesses (ONRB).

The sum of all donations received was £2,160 and the average donation was £36. The average donation made by HSRS and LBBS was £39. The average of LBBS and ONRB was £32²/₁₁ and the average of HSRS and ONRB was £36²/₃. If each HSRS had given £1 more, each LBBS had given £6 more, and each ONRB had given £7 more, the average donation would have increased by £5.

Q. How many donors were in each group, and what was the

average donation per group? (In case there's any doubt, an average donation is calculated by totalling the money received and dividing by the number of donors.)

Answers on a postcard or the back of a sealed envelope (no letters or floppy disks, please) to:

PCW Prize Puzzle - September 1996, P.O. Box 99, Harrogate HG2 0XJ, to arrive not later than 20th September 1996.

Winner of June 1996 Prize Puzzle

The problem about the farmer chasing the pig proved a bit too tough for many of our regulars. The problem can be solved analytically as some of you did, but it also lends itself nicely to a fairly easy computer simulation.

The required answers were:

- 1) The farmer catches the pig at 66²/₃ yards.
- 2) The farmer's speed needs to be more than 1.28 times the pig's speed. Answers of 1.28 or 1.29 were equally acceptable.

The winning entry, chosen at random, came from Mr Leonard Gore of London SW15. Congratulations, Mr Gore, your prize is on its way. To all the nearly-dids: keep trying, it could be your turn next. ■

WIN a trip to Transylvania

...and discover the truth behind the legend of Dracula with **The Unexplained** CD-ROM.

Sink your fangs into this juicy prize. To celebrate the release of FlagTower's latest CD-ROM, *The Unexplained*, we are giving away a trip to Count Dracula's castle in Transylvania. This interactive documentary covers everything from ghost, ghouls and the count himself, to UFOs and other paranormal phenomena. (See the review, page 229, and the demo on this month's cover disk.)

One lucky reader will get to take the fiend, sorry, friend of their choice to Transylvania on Romania Travel Centre's four-day Bite of Dracula Tour. The itinerary will include:
Day 1: Dinner at Coliba Haiducilor (The Outlaw's Hut).
Day 2: Visit to Dracula's castle in Bran. In the evening, a masked ball.
Day 3: Visit to Sighisoara, where Dracula was born. Lunch at Dracula's House.
Day 4: Visit to Snagov Monastery, where Dracula is buried.

All meals, travel and accommodation are included.

If you don't win first prize, there is still a chance for an interview with the vampire. The runner-up will win a dinner for two at the horror-themed restaurant,



Transylvania, in London.

Dare to dine with Dracula for a gloriously gruesome evening out.

Ten other winners will each get a copy of *The Unexplained* and a limited edition *Unexplained* T-shirt.

To win one of these fabulous prizes, just answer this ghostly riddle:

Who played the lead in the original film version of *Nosferatu*? Was it:

- a) Bela Lugosi
- b) Christopher Lee
- c) Max Schreck

Note: If you do not wish to receive promotional material from companies other than VNU Business Publications, please specify this on your competition entry.

Rules of entry

This competition is open to readers of *Personal Computer World*, except for employees, and their families, of VNU Business Publications, FlagTower, and the Romania Travel Centre. Entries must arrive by 12th September 1996. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes. Itinerary subject to change without notice.

How to enter

Just write your answer on a postcard, or on the back of a sealed envelope, along with your name, address and daytime telephone number, and send to: PCW September Competition, CMS Limited, PO Box 11312, London WC2H 0DJ.

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Hands On is the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.

All submissions should be emailed to the author of the appropriate section or snailmailed to *Hands On*, *Personal Computer World* Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.

We're constantly working to improve the contents of *Hands On*. If you have any suggestions, send them to the Editor at the address above, or email them to: editor@pcw.ccmil.compuserve.com



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If routine librarians are your cup of tea, get cosy on the couch with Tim Anderson.

AND THE REST...



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It had to happen... Multimedia, in the form of a little old sound card, came knocking on Stephen Rodda's door: gingerly, he let it in.



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Protect and survive

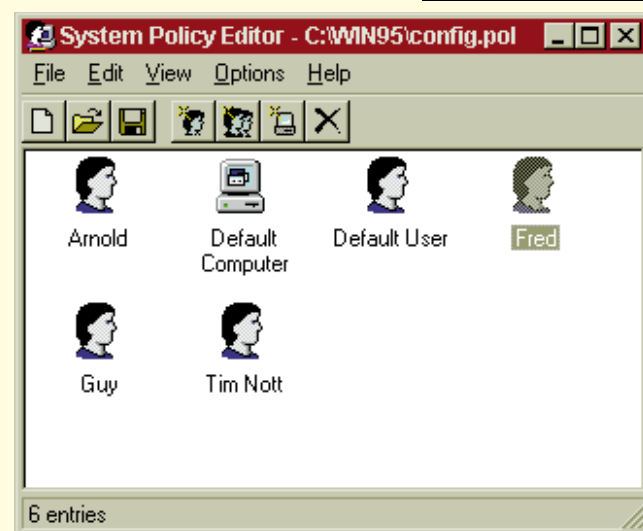
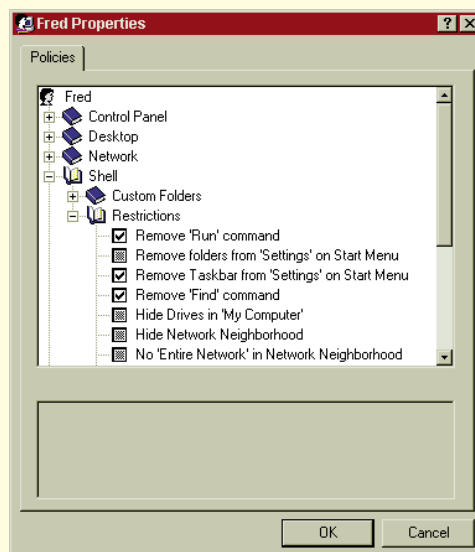
Tim Nott tightens up security in Windows 95 without the aid of deadlocks and dobermans.

There must be many readers who have the responsibility for more than one user on the same standalone PC. Whether you're an employer, an administrator, a parent, or like reader Robin Malton, a teacher, there's the perennial problem of preventing the user from "customising" the settings in ways that screw things up for other users.

As Robin states: "Most IT teachers have developed strategies for locking their pupils out of areas of Windows 3.1. Now we have got to start all over again with Windows 95. We are about to buy up to 20 standalone machines and the thought of all the chaos which will be created, intentionally or otherwise, by unrestrained use of Settings for Task Bar and Control Panel, let alone the freedom of My Computer, is causing grey hairs."

Windows 3.1 has some fairly minimal locks; notably the restrictions that can be made to Program Manager and Control Panel by editing the .INI files. Windows 95 is no Fort Knox (for real security, you'd use NT Server) but it does go a fair bit further.

First, a brief word on User Profiles and System Policies. User Profiles are basically those bits of the Registry that are stored in USER.DAT. On a network, these can be used in two ways. Firstly, System Policies can be set up to give mandatory profiles to users (or groups of users), with restrictions to stop them altering various aspects of



their system. The obvious advantages of this are the savings in training and support costs. Secondly, profiles can be made "portable", which means roving users can log on from anywhere on the network and fire up their own desktop. In these cases, policies and profiles are stored on the server.

Fortunately, networks are not my brief. However, the same tools can be used on a standalone PC to give different users various settings or levels of access. You might, for example, share a PC with a colleague who works a different shift, but still want to keep your own desktop settings. Or you might, like Robin Malton, want to prevent reckless or mischievous meddling.

A matter of policy

It's a lot more complicated and confusing than the pre-95 editing of plain-text .INI files and, as you've probably already guessed, involves the Registry. The usual warnings about backing up USER.DAT and SYSTEM.DAT apply here in spades. It's extremely easy to foul things up, lock yourself out of the system and seriously damage your mental health. It's also appallingly documented, but after consulting the Windows 95 resource kit, the Microsoft Technet, with a bit of inspired guesswork and a lot of trial and error, I think I've just about got the drop on it.

The good news is that Microsoft has provided a specific tool for the job, the System Policy editor. This is on the Windows 95 CD. Use Control Panel/Add-Remove/Windows Setup/Have Disk then browse the CD to

`\ADMIN\APPTOOLS\POLEDIT\`
to install it. As the helpfile isn't much help, have a look for

`\ADMIN\RESKIT\HELPPFILE\WIN95RK.HLP`
as well. This is the Windows 95 resource kit, which contains a mine of useful information in a helpfile. If you installed from floppies, or had Windows 95 pre-installed on a PC, then the files are available from Microsoft (see *PCW Contacts*, page 250).

Having installed the Policy Editor, the next step is to enable User Profiles. From Control Panel/Passwords, select "Users can customise...". Make sure the two options below are also ticked, then restart the computer. You'll be prompted for a user name and password. This user is going to be *you* — the System Administrator and Master of the Universe — so choose wisely. You'll be asked if you want to retain your settings between sessions. You do.

You'll find that things have changed somewhat. In the Windows folder, you'll find a new folder called Profiles. Inside this will be a single folder corresponding to

your user name. Inside that will be your own personal registry files: USER.DAT and USER.DA0 (the backup), and three other personal folders: Desktop, Briefcase and Recent. You might also find that some of the files, folders and shortcuts that were on the desktop have disappeared. Don't panic, they can still be found in the Windows\Desktop folder. You'll also find that the close-down dialogue has sprouted an extra option: "Close all programs and log on as a different user".

The installation of Poledit should have copied a file called ADMIN.ADM to the WINDOWS\INF folder. If not, or if you installed Poledit by hand, you'll have to copy this from the CD. Once POLEDIT is installed and running you may get prompted to choose a template: if so, browse to WINDOWS\INF to find ADMIN.ADM; if not, check that this file is the one cited in the "Options/Template" menu. If you can't find the INF folder, then select "View/Options/View" from any open folder and tick "Show all files".

Open the "File" menu and choose "Load Registry". You'll see two items appear in the main window: "Local User" and "Local Computer". Double-clicking on either of these produces a new window that looks rather like a Helpfile contents with an expanding tree of book icons.

Network?... What network?

Now it starts to get hairy, as even the Resource Kit leaves you on your own. The correlation between system policies and user profiles is a nebulous thing and, at least on a standalone PC, gives the impression that the groups of programmers responsible didn't like each other very much.

The first thing to do is alert the Registry to the fact that not only are there different users, but that system policies are in effect. In other words, Windows has to look for a policy file on startup. Open "Local Computer" and double-click the "Networks" book. Yes, I know you're not on a network, but remember I mentioned the words "complicated" and "confusing" earlier. Double-click the "Update" book, then tick "Remote Update". In the panel below, choose "Manual (use specific path)" in the "Update Mode" box and type in a path below that. Using the defaults, this would be

`C:\WINDOWS\CONFIG.POL.`

OK the dialogue, then save and close the Registry.

Now open a new file in the Policy Editor. Again you'll see the same items, but this time you'll be able to add new users from the "Edit" menu. Add one with exactly the same name you logged in with. Click

on yourself and you'll see five "books": Control Panel, Desktop, Network, Shell and System. These all expand into a series of check boxes which can be in one of three states. Ticked means the policy is in force or, if it isn't, will be put into force next time that user logs on with the Registry amended to suit. Clear means the policy isn't in force, or will be removed from the Registry at the next log-on. Greyed means that the status quo will be preserved. Nothing will be added to, or removed from, the Registry.

In general, it's better to grey than to clear. For a start, clearing can remove settings you may not want removed. Secondly, as greyed settings are ignored, processing the registry is much faster. Some settings, such as the "Update" in the last paragraph, have an extra panel below.

To get the hang of this, experiment with your own ID and something harmless. All user policies should be grey to start with, so go to "Desktop/Wallpaper", tick the box and choose a wallpaper file from the list. Obviously, choose something different from the current one. Save the Policy file with the name you specified earlier (C:\WINDOWS\CONFIG.POL) and close down Windows. If you log on as yourself again, you'll see your wallpaper has changed to that specified in the policy. You can change it back, assuming you haven't restricted Control Panel access, but only on a per-session basis. Clearing the box, in this case, means you'll always start without any wallpaper. Greying the box means that the Control Panel wallpaper settings function as normal and are saved between sessions.

Once you've got the hang of this, you can begin restricting the Default User. All new users will be based on these settings. If you expand the tree, you'll see that the Control Panel section can restrict various levels of access to the Display, Network, Passwords, Printers and System. All are adequately explained in the sub-options so I won't go into much more detail. You'd probably want to enable all the restrictions in the System section, for instance, and also at least keep users away from the Display/Settings page. Somewhat strangely, you can't protect other sections, so users are free to screw up their fonts, multimedia and other settings.

School uniform

The Desktop section lets you set mandatory wallpaper and colour schemes, if you're into the "regulation issue" look. The Network section, which is about file and printer sharing, needn't concern us. Moving on, the Shell section gets more interesting. First, you can decide whether users can

have their own custom folders for the Start menu and Desktop. In a classroom situation you might not want this, but two people sharing a PC probably would.

The next bit is where it gets interesting for wannabe System Stalins. Under Shell/Restrictions is plenty of privilege waiting to be taken away. You can disable the "Run" and "Find" and "Settings" commands from the Start Menu, remove drives from "My Computer" or even everything from the desktop. There's a "Don't save settings" option which is extremely useful as it means that users can't leave a mess of open folders for the next person; and finally, there's an option to disable the Shut Down command. This latter is a very bad idea as the only way to exit Windows is by resetting the computer. This, as many Windows 95 users have found to their cost, is an open invitation to the gremlins of chaos to invade the machine.

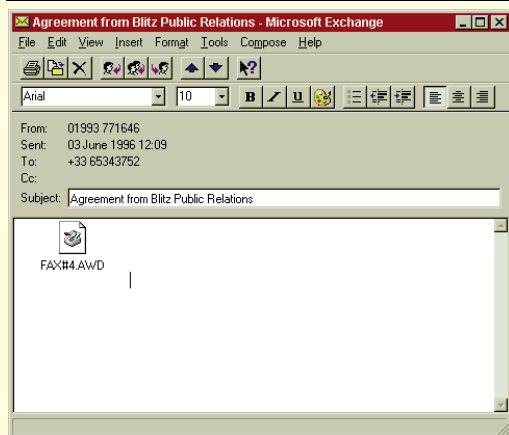
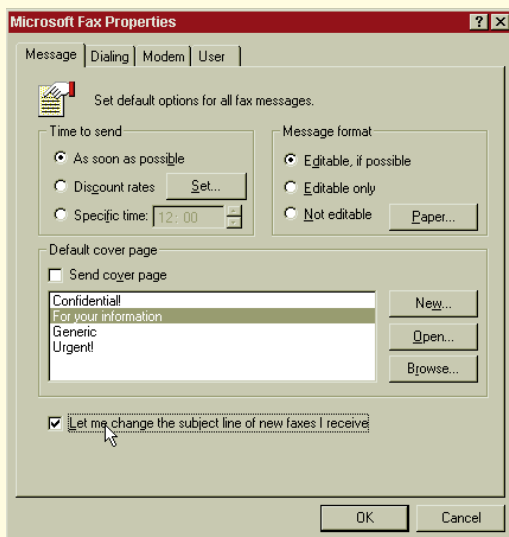
Under the next "System" section you can disable both normal and single-mode DOS sessions as well as Registry editing tools. It is rather misleading as it doesn't disable Poledit, only Regedit, so you might want to make sure the former isn't left on the hard disk of the PC. The final, and most restrictive, setting is to "Only run allowed Windows applications". The bad news here is that you have to type in a list of each application by hand; you can't browse or select. However, having done this once you can, of course, copy the policy file across a classroom full of machines.

Having set up restrictions for the Default User, do check that you haven't inadvertently restricted yourself. I have a strong suspicion that some settings "migrate" but I haven't yet caught them in the act. Save the policy file, exit Poledit and exit Windows. You should now find that when any new users log in with a new name and a password, they will inherit the default user restrictions.

Plugging the hole

With multiple users enabled, as I said earlier, you get a password prompt on logging in, with the default name of the last user. Although you'd obviously want a password for the system administrator, passwords are not obligatory. You could have "Class 5A" as a user with a blank password. There is, however, just one teeny-weeny snagette. If you hit the "Cancel" button, everything reverts to where we came in. The desktop goes back to how it was before multiple users were enabled, and all restrictions are lifted.

If you log back on as yourself, run Regedit and open HKEY_USERS, you'll



**Top Enabling this setting...
...lets you give meaningful descriptions
to incoming faxes (above)**

see two branches: one with your name and another named .Default. The latter retains the original settings and is used when the "Cancel" button is pressed during log-on. So just do this: restart Windows, hit "Cancel" and run Regedit again. You'll see just .Default in HKEY_USERS. Close Regedit, run Poledit and open the Registry. Now apply the same restrictions to the Registry as you did to the default user in CONFIG.POL. You'll then find the Cancel button leads to the same restricted environment as the default user log-in. If you want to restrict all users to the same degree, you can skip all the above except for the previous paragraph. Bear in mind, however, that you want to leave yourself a way in to the system.

It's still by no means perfect. There are more holes in it than in the Swiss Emmental cheese mountain. There's no way to password-protect folders or partitions, which means that as long as users can open one folder, they have access to the entire PC. Even with all restrictions in place and just Notepad.exe in the list of permitted programs, it's a trivial matter to open Explorer from the File/Open dialogue.


Another big nuisance item is that anyone can create a new user ID and insist on having their settings saved, which can lead to a proliferation of unwanted individual folders, even though the Custom folders options are cleared for Default User.

A couple of further safeguards you might like to consider are setting BootKeys=0 in MSDOS.SYS so the user cannot use the function keys to stop Win95 loading at startup. You might also like to disable floppy disk-booting from the PC's CMOS settings, and password-protect the CMOS itself. This process will vary, so you'll need to consult the hardware manual.

What the fax?

And now for something completely different and far less brain-damaging. In July's column I had a good moan about Exchange, but recently I've actually managed to discover something I like.

Looking through the faxes in my Inbox I was struck by the fact that in the "From" column was the number of the caller. If the caller hadn't set their fax machine or software to give this information, then it stated "Unknown fax machine". The "Subject" field didn't actually tell me anything more. It either showed that this was a fax from the number in the adjoining column or, if this was unknown, simply "Fax".

Rather a waste of time and space I thought, until, browsing the Inbox menus, I came across the following well-buried secret. From the "Tools" menu, go to "Microsoft Fax Tools/Options". Or, if you prefer the scenic route, go "Tools/Options/Microsoft Fax" and click the "Properties" button. Either way, you get a four-page dialogue for "Microsoft Fax Properties". And there, on the "Message" page, is a tick box for "Let me change the subject line of new faxes I receive". Which says it all really. Now, when you double-click on a fax in the Inbox, instead of going straight to the viewer, you're in the fax editing window with the fax file shown as an icon. Double-clicking on the icon launches the viewer, but the bit I like is that you can now alter the "Subject" field to read something sensible and informative. 

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No hawkers, circulars or binary attachments, please.

Microsoft 0345 002000;
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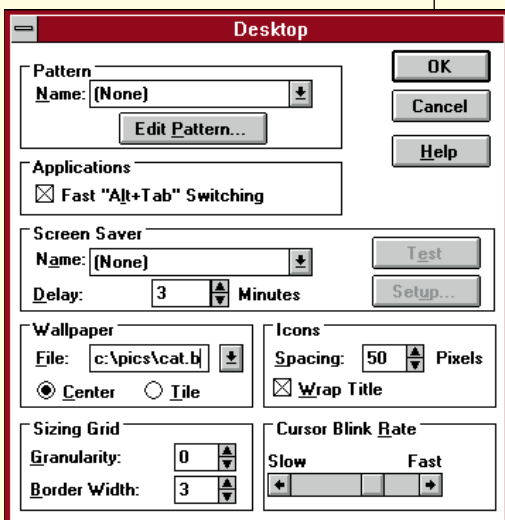
It's hard to believe that Windows-as-we-know-it has only been around for six years; less if we include all the trimmings like multimedia and TrueType. Over the next few months I'm going to take a fresh look at some of the new wonders of the nineties desktop. One of the fun things introduced with Windows 3.0 was wallpaper. You can have a bitmapped image as a backdrop to your screen, which can be a full-screen picture, or a smaller image centred in the screen, or "tiled" as a repeated pattern.

It's all rather fun, especially if you ditch the rather boring examples supplied with Windows and go after your own. You doubtless know that you change the wallpaper from Control Panel/Desktop, but there are a few undocumented wheezes here. For a start, Control Panel will only look in the Windows directory for the list of possible files. However, if you type in the path to a file elsewhere, Windows will find it and use it.

You can use Paintbrush to create wallpaper: set "Options/Image Attributes" to your screen size first; but you'd need to be especially gifted to create a startling, original work with that piece of software. It's easier to use it to vandalise or, depending on your artistic sensibilities, improve on an existing work. Remember that you can use any of your fonts in Paintbrush to add embellishments such as speech balloons.

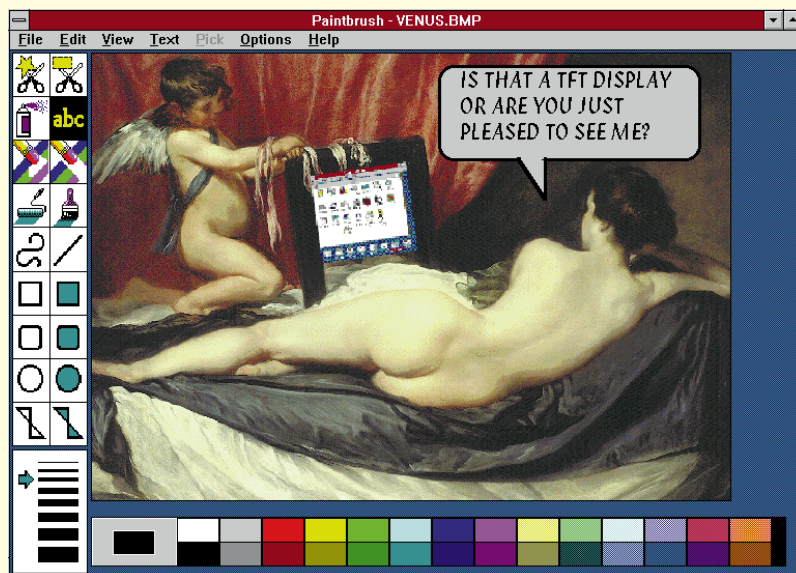
The downside of wallpaper is that it

Time for a change — type the path if the file's not in Windows



Roll playing

It's time to have some fun, so climb the ladder with Tim Nott and hang that wallpaper... paint that screen...



Vandalising great works with Paintbrush

The RLE files won't appear in the Control Panel/Desktop list but, once again, you can type them in (including the extension) by hand and Windows will display the file in an identical fashion to a BMP.

Paper puzzle

takes up space, both in memory and on disk. A 1024 x 768 x 256 colour backdrop takes up three quarters of a megabyte, so if RAM is at a premium choose a smaller, tiled picture, or fewer colours. If you're going to change your wallpaper often, disk space will be an issue, as well.

One way around this is to convert your files to the RLE format using image processing/conversion software such as the shareware PaintShop Pro. BMP files store the information as a straightforward list of pixels — for example, red, red, red, white, white, blue, blue, blue, blue. Run Length Encoding stores the same information as "three red, two white, four blue". Depending on the type of picture and the amount of detail, this will shrink the file size; it doesn't work too well on photographic images but is good on pictures with large expanses of the same colour, such as cartoons.

If you want to really confuse nosey-parkers while you're away from your desk, try the following. With plenty of "interesting" windows visible, press PrintScreen to copy a screen image to the clipboard. Open Paintbrush, set "Image attributes" to the same size as your display, then Zoom out. Paste in the captured screen (you may have to do this twice) and save. Quicker still, paste, then immediately "Edit/Copy to..." an appropriate file name.

Set this file as your wallpaper, and close everything except Program Manager. Select "Move" from the Control menu (Alt+Space) and use the arrow keys to move Program Manager completely off the screen. Press Enter to fix it in place, then make yourself scarce and watch the fun as the victim clicks around the fake desktop wondering why nothing works. To restore Program Manager, Ctrl+Esc and "Tile", or select it with Ctrl+Esc, press Alt+Space, then arrow back on to the screen. This way of clearing the desktop is also a good way of grabbing a screen of

Tim's Tips — What the f?

Be the life and soul of the pub with these funky function key shortcuts:

F1	All applications	Gets help.
F2	File Manager	Drops the list of drives.
F3	Most text applications	Starts the "find" command or repeats the last "find".
F4	Write, Cardfile	Go to a page or index.
F5	Notepad	Inserts the time and date.
F5	Cardfile	Dials the first number with four or more digits on the card.
F5	Write	Normal text (F6,7,8 for bold, italic and underline).
F5	File Manager	Updates the contents of the active window.
F6	File Manager	Switches through current file/directory/drive.
F6	Cardfile	Edit index entry.
F7	Cardfile	Add a record.
F7	Program and File Managers	Move selected item.
F8	Program and File Managers	Copy selected item.
F9	Calculator	Toggles +/- . And there are lots more in scientific mode (too boring to list here).
F10	All applications	Highlights the menu bar — use the underlined letter or Arrow keys, then Enter, to open a menu.

tiled wallpaper that you might want to use as a background to some other creation. Another rather surreal effect is to take a screenshot of Paintbrush, paste it into Paintbrush, and continue the process in a recursive manner.

What on earth?

Just to show there's always something new under the sun, I came across an interior decorating tip today, that I'd never seen before. Have a careful look at the screenshot, below, with the 256-colour "Planet Earth" backdrop. Bitmap size 640 x 480? No. It's only 260 x 340.

The desktop colour has been set to black, the same colour as the background to the photo, the wallpaper has been set to centred rather than tiled (hence the Tile-WallPaper=0 in WIN.INI) but I've moved the goalposts (or rather the centre) so the picture sits in the top right-hand corner.

The lines to add to WIN.INI are:

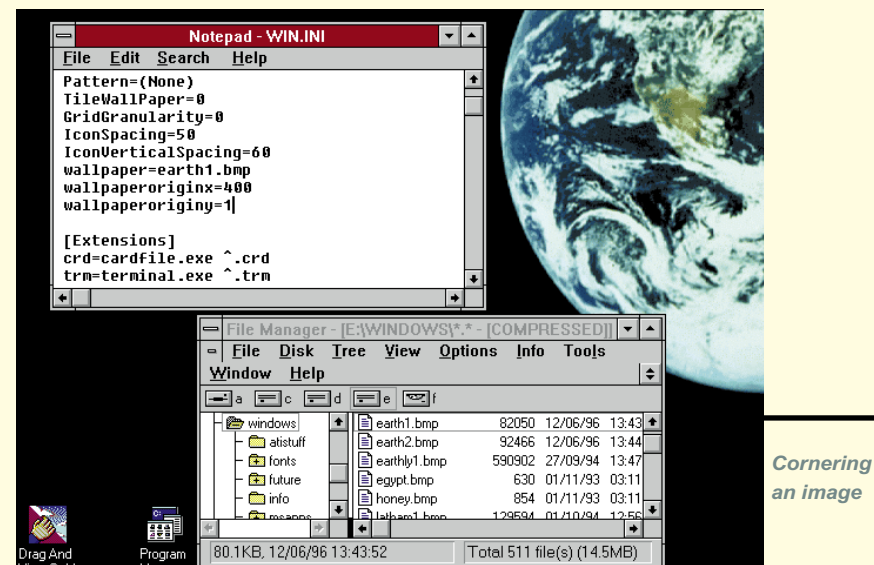
```
WallpaperOriginX=number
WallpaperOriginY=number
```

As you can see from the screenshot, the capitalisation doesn't matter and *number* is the distance in pixels from the top left of the screen to the top left of the image. Note that if you set the number to zero, this is the same as omitting the entry, and the position reverts to the centre.

Now entering the ChromaZone

And now for something equally frivolous: screensavers. I must admit I've had loads. At one time I had this little man with a beard who lived on a desert island. Every day he'd do something different. Or not. You could watch it for hours on end, with absolutely no satisfaction whatsoever, rather like daytime television.

Then there are those things that take up tens of megabytes of disk space, ferret

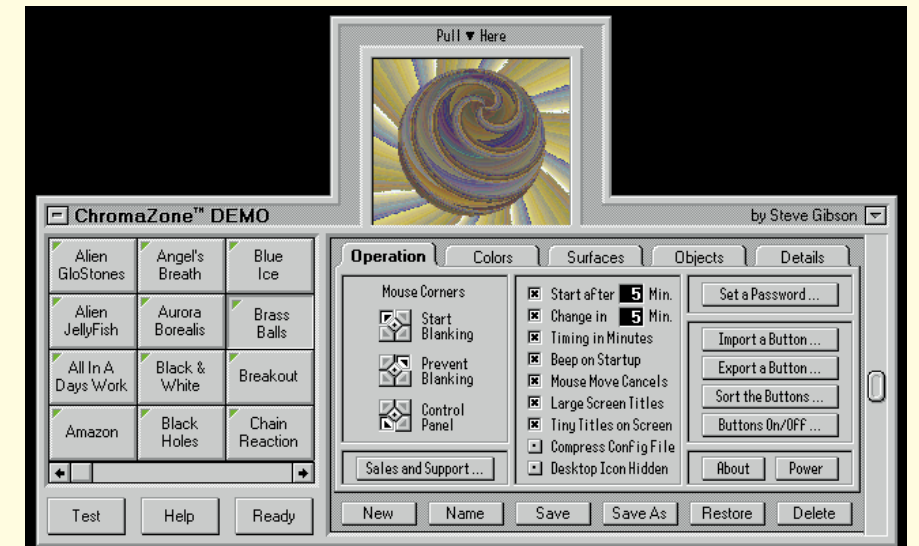
**OEM text**

A quick query from David Clarke harks back to my February-issue column about the clipboard.

David says: "I was impressed by the facility to view text copied from a DOS application in its original spacing and OEM font. Is there a way of pasting this into a Windows application together with the original formatting and spacing? And what does OEM stand for?"

To answer the last question first, OEM stands for Original Equipment Manufacturer. The reason why Microsoft should thus name a font that comes with DOS and Windows is lost in history, but the OEM character set differs from the Windows one. If you look at the Terminal font in Character map, for instance, you'll see that the upper range of characters include the box-drawing and shading symbols used in DOS screens. If you open Write, for example, and switch to the Terminal font, you'll see that Alt+0206, which normally produces an uppercase E-acute, now produces a double top-left corner. Unfortunately, this doesn't work via the Clipboard — whatever you set the font to in the target application, you still get the normal Windows characters. The nearest you can get is to take a screen image of the DOS or clipboard window by pressing Alt+Print Screen.

deep into your system files and are screamingly funny — for the first fortnight. Then there are the ones that by some triumph of PR over reality, achieve cult status: oh, why did I download the Guinness advert? Peer pressure? Beer pressure? Anyway, I've just found a screensaver I



Welcome to the ChromaZone — who said windows have to be rectangular?

rather admire. It has three things going for it. First, it produces wonderfully hypnotic, swirly patterns without the user having to resort to pharmaceutical assistance. Second, there are hours and hours of displacement activity to be had configuring it. Third, it packs an enormous amount into a tiny space.

The demo, included on this month's cover-mounted CD-ROM, unzips to a single 180Kb executable and contains 100 different preset effects, all of which can be tweaked and twisted — in the full version you can save your own.

It was created by Steve Gibson, who wrote the hard disk utility, Spinrite. It's writ-

ten in assembler, which means it's fast, compact, and you can do wonderfully non-Windowsy things such as open sliding panels to get your hands on the controls. In order for it to work you need a 256-colour display, as the secret of the "animation" is that it's not animation at all — the shapes stay put but the colour palette shifts, giving the illusion of movement.

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ChromaZone@grc.com



The X files

X Window (minus the s and the hyphen, note) has a friend in Chris Bidmead. Author Don Hopkins, however, can barely find a good word for it.

I'm always careful to call it "The X Window System" or just "X", because in the early days I used to get howled down by X buffs for daring to pluralise it and so invite confusion with products from a certain large PC software company.

A couple of months ago, I was investigating how to organise my NeXTStep installation on a 2Gb hard disk. At one point I thought that logical partitions might be the answer, but the BSD folks who live at the bottom of NeXTStep were ahead of me on this. The manual page for this particular version of fdisk concludes with the observation: "fdisk knows nothing about logical partitions, which are sub-partitions of an extended partition. Nor perhaps should it, as these are gross kludges from the Evil OS Company of the North."

Even X fans are beginning to slip into using "X Windows", and these days you see it all over the place. (By the way, hyphenating "X Windows" remains a definite no-no.) Not that Don Hopkins, author of a piece entitled *The X-Windows Disaster*, could ever be described as a fan.

Don Hopkins is a user-interface designer and graphics programmer who ported SimCity to X11, and describes himself as "working for Kaleida" at the bottom of the Web page I have here (http://www.digital.de/people/jmh/Unix_Haters/x-windows.html); what that means precisely, with Kaleida gone and Apple in disarray, is hard to say. I tried to get onto the home page indicated for Don at <http://web.kaleida.com>, but my browser tells me there's no such host.

Wherever Don is, his opus, actually a chapter from a book called *The UNIX Hater's Handbook*, lives on. As readers of this column will know, I'm a keen user of X because of the way it helps me unify these different operating environments about which I write, but I haven't had to program to it. Here's a flavour of Don's views:

"X-Windows is the Iran-Contra of graphical user interfaces: a tragedy of political compromises, entangled alliances, marketing hype, and just plain greed... If you sit down at a friend's Macintosh, with its single mouse button, you can use it with no problems... but just try making sense of a friend's X terminal: three buttons, each one programmed a different way to perform a different function on each different day of the week — and that's before you consider combinations like control-left-button, shift-right-button, control-shift-meta-middle-button, and so on."

But Don's chief complaint about X is the way different X applications work together. Or rather, don't. Interoperability

depends on programmers following the arcane rules set by the X Consortium in a tome called the *Inter Client Communication Conventions Manual*.

"The ICCCM," says Don "is unbelievably dense. It must be followed to the last letter and it still doesn't work. ICCCM compliance is... so difficult, that many of the benefits just aren't worth the hassle... And when one program doesn't comply, it screws up other programs. This is why cut-and-paste never works properly... drag-and-drop locks up the system, colourmaps flash wildly and are never installed at the right time... and deleting a popup window can quit the whole application."

Don lays it on with a trowel, but I have to confess it's all true. A camel is a horse designed by a committee, runs the old joke, and X certainly is that horse. But, but... it mostly works and I certainly wouldn't be without it. At least not until something better comes along.

Don Hopkins' biographical footnote at the bottom of the Web page adds a little twist of the knife: "To annoy X fanatics, Don specifically asked that we include the hyphen after the letter X as well as the plural of the word "Windows"...).

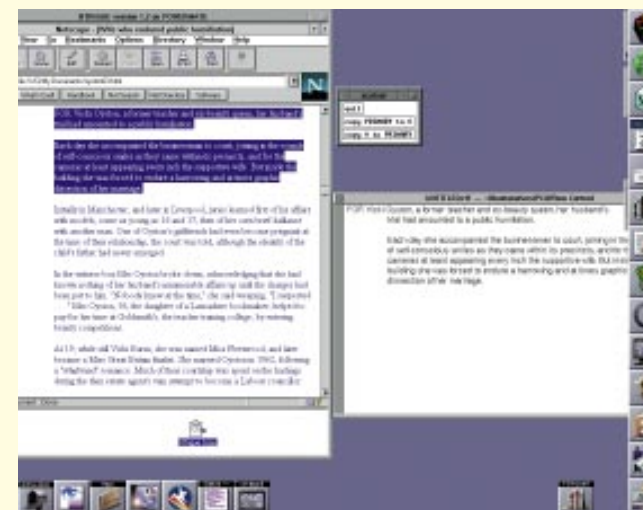
Caldera and Linux

Some months ago I mentioned that Ian Nandhra, of Lasermoon, was running the gauntlet of the X Open Consortium. His plan was to take Linux-FT (his own version of Linux) through the compliance tests, and pay the huge sums of money required to certify Linux as UNIX and get it branded as such.

This is important stuff, with huge implications for the Linux community and, perhaps, for the world at large. But frankly, I never understood how a modest UK Linux vendor like Lasermoon was going to stand up to the ordeal of having the X Open Consortium's hand deep in its pocket. Well, it isn't. The financial responsibility for this extraordinarily brave venture has passed to broader shoulders and now Caldera Inc is carrying the baton.

Caldera, as regular readers will know, is the company

Linus Torvalds, author of the Linux kernel, is reported to be very fond of penguins, and wants this one adopted as the official Linux mascot. Amit Margalit <amitm@ggf.netvision.net.il> is making this picture available from ftp://chaos.fullerton.edu/pub/Linux/XBanner/linux_logo_peng.gif



Cut-and-paste assisted by the xcutsel widget. Netscape is framed in the NTrigue X windows, at the bottom of which you can see the NTrigue copy utility. The red arrow indicates that test is sitting in the buffer, ready to be copied out

founded on the considerable wealth of Ray Noorda, ex-CEO of Novell. This is more than just another Linux distribution company. The central idea is to create a "Network Desktop" that will offer an alternative to the One Microsoft Way.

This ambition has a number of implications, most of which seem to be dealt with responsibly by Caldera. Providing an excellent, low-cost product is only the first hurdle, and that's where Linux comes in. The Red Hat Linux distribution provides the underpinnings, so the majority of what you pay for with your \$99 is all the commercial trimmings: the Looking Glass Desktop, the font server, the Accelerated X Window system, the Netware connectivity, the Crisp text editor, and so on. The second hurdle is to make applications available for this environment, and Caldera is working hard to encourage Unix vendors to port their software across.

Caldera seems to be very serious about getting all this working, building the market for third-party software and helping developers sell in to that market. To help this "emerging technology to obtain widespread implementation in the business environment", as Caldera's portentous promotional prose puts it, requires the creation of "technical support programs and corporate accountability".

Corporate accountability is the big issue. Linux is, technically, already good enough to have earned a place in serious corporate computing, but it meets a lot of resistance (even among those who have heard of it) because it gets inaccurately categorised as shareware. X/Open certification, as Ian Nandhra understood, would make a crucial difference.

Caldera has taken the Linux-FT development team aboard and is working towards what is now called Open Linux. This isn't, as some Linux news-groups have been speculating, an attempt to hi-jack GNU software on

behalf of a commercial venture. Well, Caldera is commercial all right, but Open Linux, the base on which it will be built, is (according to Caldera's own press release) going to be "published freely with full source code via the Internet to individuals and organisations seeking stable, UNIX-systems solutions."

The Caldera toppings, of course, will remain proprietary. But the important thing, it seems to me, is that the core Linux distribution, certified as fully compliant with the new Single UNIX specification, will be returned into the Linux community. When? Round about the time you're reading this. Check for further details on <http://www.caldera.com>.

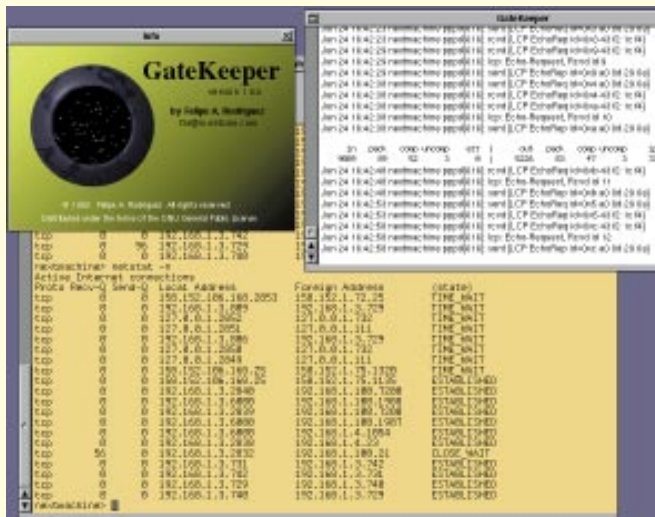
Cut and paste

I left you last month with that puzzle about getting data in and out of NTrigue. Or more generally, cutting and pasting between any two X windows that don't agree about how to use the cut buffers.

Even the keenest fans of X tend to agree that it has its unwieldy aspects. The multiplicity of cut buffers, combined with the way a selected block of text is also able to act as its own cut buffer, does nothing to detract from this reputation. And some people flatly hate X (see later).

The gurus at MIT (the Massachusetts Institute of Technology) had obviously had a similar problem with copy and paste between pre-release 3X clients that know nothing about PRIMARY and later clients that use it. So (as I learn from the pages of the manual), one Ralph R Swick of the DEC/MIT project Athena, came up with a little utility called "xcutsel". The page states: "The xcutsel program is used to copy the current selection into a cut buffer and to make a selection that contains the current contents of the cut buffer."

Xcutsel pops up a small widget with three buttons on it labelled quit, copy PRIMARY to 0, and copy 0 to PRIMARY.



This is the PPP dialler I use on my NeXT machine. The white window is for GateKeeper's own diagnostics, and in the yellow window behind I'm running netstat, a generic network diagnostic tool that shows the internet connections

As NTrigue's copy utility NTRUtil.exe puts the output of a Windows NT copy or cut operation into the Primary buffer, and the CubX X Window server uses Cut Buffer 0, xcutsel provides a convenient bridge. It's a standard part of most X distributions, so it might be worth looking at if you have problems with cut-and-paste operations on any of the X platforms.

PPP plays up

I'm currently going through some problems with one of my Internet Service Providers (ISPs), and the tribulations are teaching me a lot about PPP (Point To Point Protocol); some of it even useful!

Unless you are lucky enough to have one of these flash high-bandwidth direct internet connections, the link from your Linux box, or Windows NT machine, or whatever is likely to use one of two serial protocols, operates out of your comm port, through your modem and along your telephone line.

The two protocols are called PPP and SLIP (Serial Line Internet Protocol). There is also a common variant of SLIP called CSLIP (Compressed SLIP) and you might also come across proprietary variants (with cute names like PinkSlip). These latter are a curse and to be avoided. They usually mean you are locked in to whatever client software the ISP provides, which in turn dictates the operating system under which you run it. Guess what that turns out to be?

It's PPP with which I've been having problems. Under the various flavours of Unix it's normally a chunk of code compiled into the kernel or loaded as a module, combined with a daemon that you power up when you want to make the link. Additionally, it's normal to address PPP through a user interface program that handles dialling and passes the correct parameters to the underlying PPP daemon.

Most Linux distributions come with all this stuff in place, although you might have to recompile your kernel to get it working. NeXTStep was designed around the assumption that you're going to be directly connected into the internet though your network, so I had to add the PPP connectivity myself, with a certain amount of help (well, a lot of help, actually) from the indispensable Paul Lynch, NeXT specialist *extraordinaire*.

When, after having worked happily for many months, the PPP link started to go wrong a couple of weeks ago, I didn't know where to start looking for the fix. I would acquire what looked like a perfectly good connection but wouldn't be able to fetch any web pages. Mail worked, but only in a strangulated sort of way that often left the larger outgoing messages stuck in my queue.

Luckily, I had other routes out to the internet, but I was determined to use the opportunity to learn more about PPP and, hopefully, fix it without imposing too much on Paul. My first port of call was the manual page for pppd (the PPP daemon). Manual pages can be confusing, even frightening. The trick is to try to enjoy them even if you don't understand them: you're bound to get something out of reading them, even if it's only more bafflement.

Here's how the manual page for pppd starts:

```
NAME
pppd - Point to Point Protocol daemon
SYNOPSIS
pppd [ options ] [ tty_name ] [ speed ]
```

Okay, so this is a daemon you call with parameters (these are normally passed by the dialup program). The port on which to look for the modem [tty_name], and [speed], the speed of the modem, were obviously okay, otherwise I wouldn't have had a connection of any kind. The problem probably lay somewhere in the first para-

meter you pass; a multifarious thing called [options].

The possible options are listed further down the manual page. There is a lot of them, some incomprehensible (to me). By correlating the options passed by my dialler as previously set up for me by Paul with the list in the manual page, I began to understand a little of what the connection was all about. To cut a long story short; a series of gentle experiments with the options (singly!) revealed bsdcomp, standing for BSD compression. The manual page states:

```
"bsdcomp nr,nt
Request that the peer compress packets that it sends, using the BSD-Compress scheme, with a maximum code size of nr bits, and agree to compress packets sent to the peer with a maximum code size of nt bits."
```

My options were pre-set with bsdcomp 10,10, but it occurred to me that compression schemes like this were probably instituted in the days before modems were smart enough to do their own compression. I know that imposing one compression scheme on top of another can sometimes drastically slow down a link. Of course, this doesn't explain why the link should have suddenly strangled itself, but I thought it might be fun to take out the BSD compression and see what happened. When I did this (by changing the bsdcomp parameters to 0,0) the link suddenly leapt into life — amazing.

What may have happened is that the ISP switched over to a set of different modems and that suddenly, my modem found itself able to negotiate a more sophisticated compression scheme that happened to fall foul of bsdcomp. I'm going to have a play with the compression parameters on the modem and on PPP to see if I can verify this.

Meanwhile, it's a real relief to have the link back. ■

New, next month

As from the October issue, Hands On 32-Bit will become Hands On Unix which, we hope you will agree, is more relevant to today's computing needs. The new Unix column will continue to be written by Chris Bidmead.

● We will also be introducing a new Hands On column for Windows NT buffs, written by Dale Strickland-Clarke.

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Microsoft rules and nuggets catch on

What does the future hold for word processing? Tim Phillips shares his visions with you. Plus, he sets off on a TrueType Easter egg hunt.

The first vision: Microsoft continues to rule the known universe.

In favour of this, there's the recently reported figure, from Romtec, which follows the sales of hardware and software. It tells us that Word for Windows has an 80 percent share of the word processor market. That compares with the year before, when the figure was a comparatively puny 64 percent. The rest of the Windows space is divided between Ami Pro (or Word Pro) at 11 percent, WordPerfect at eight per cent, and others at a glorious one percent, combined.

I believe these Romtec figures. Unless the market changes, Microsoft will continue to dominate for economic reasons. Imagine you were producing ProcessorWrite in the late eighties: one of the packages which had a ten percent market share; your development cycle was six months; you could upgrade every two years; you had one version to support; you made 70 percent of the copy price as profit.

Now you want to develop PW95. You can hope for a one percent market share — equivalent in units to the old ten percent. The development cycle is 18 months, because these days word processors are complicated by things like OLE, online spell-checkers and autocorrect. Your distribution costs are the same but software sells for a third of the price it used to, which wipes out your profit margin. You have to upgrade once a year. Nobody writes about your product, except one nutter in *PCW* who sticks in a 200-word where-are-they-now boxout in his *Hands On* column.

As you can see, selling word-

processing software is not the game to be in right now, unless your name is Bill Gates. If you're looking for a new version of your word processor, and you are not using product from the "Big Three", don't hold your breath.

The second vision

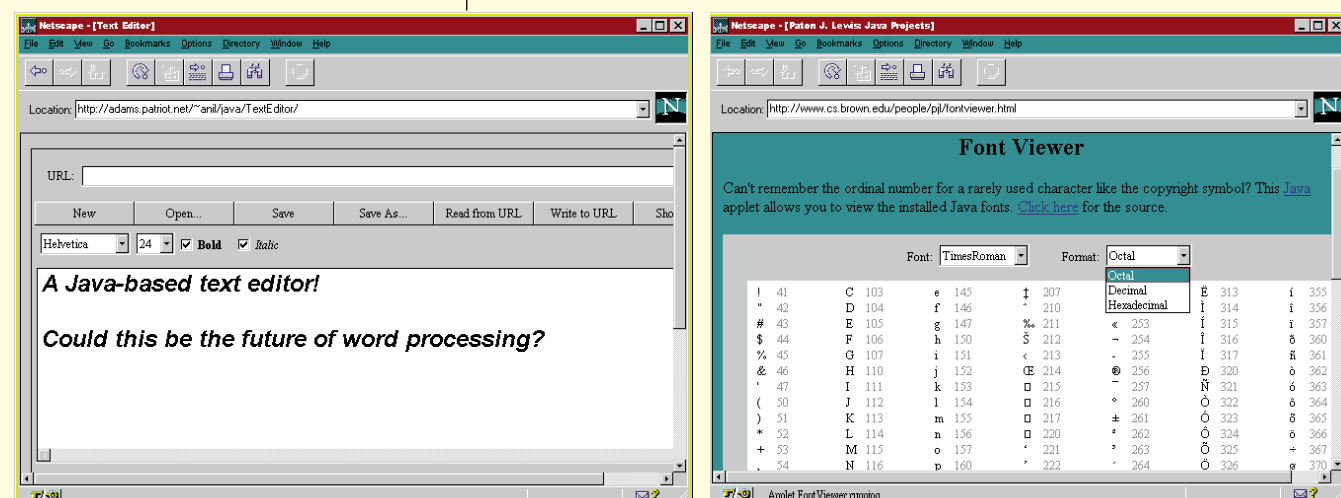
The network computer takes off and people start supplying Java word processors: little nuggety applications that you download from the server each time you want to use them, instead of storing them on a hard disk. Will they catch on?

If you are considering whether to buy a PC or wait for a network computer for your home, I wouldn't hold your breath. Buy a PC, and make sure it has Microsoft Office on it. Neither Lotus nor Corel-WordPerfect are selling any copies of their office suites bundled with a new computer.

In the longer term, the case for a network computer running its own applications from the Internet seems

Left A Java-based text editor that you can find in the list of utilities at www.gamelan.com. Rough and ready, but it works

Right More obscure: a Java-based application that will tell you the hex, decimal or octal code of any character in any font. Good for those handy copyright symbols on a web page...



unanswerable. They probably won't be word processors as we know them, though: instead, there will be central resources; a spell-checker or a graphics engine, for instance. There will also be custom-designed applications to let you make a form letter or a hypertext document, or whatever. These will all be stored in a huge library. The era of the one-size-fits-all word processor is surely nearing its end.

If you want evidence, take your web browser (Netscape 2 or greater, or Internet Explorer 3) to www.gamelan.com, and browse through the 2,500-plus applets already there. There's one that writes your job application letter for you by comparing your CV with the job description. There's a rather good graphics applet. And there's a dictionary — you write the word, it returns the meaning. What there isn't, is a copy of Word for Windows. This is what word processing will be like in five years' time (I hope).

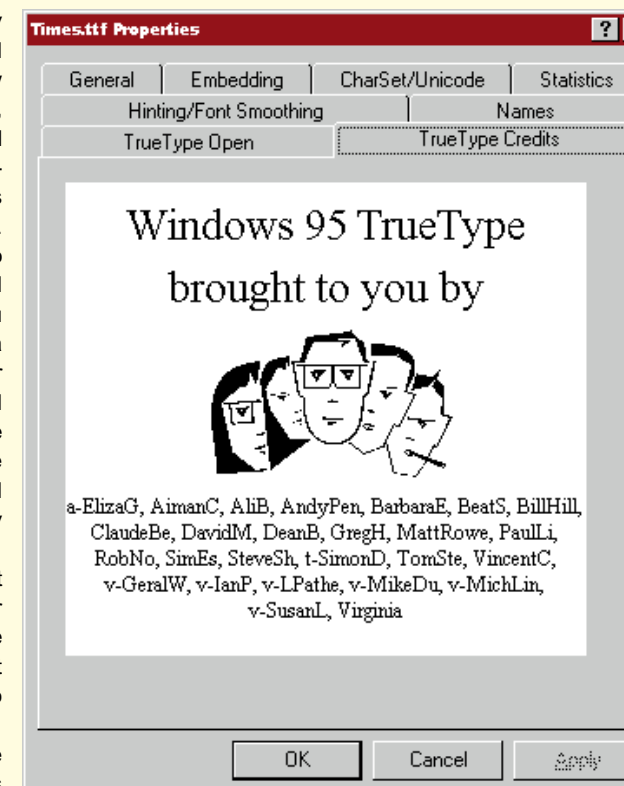
Eggs over easy

You really can't get enough of TrueType, can you? I've been deluged by people wanting emailed copies of [property.zip](#), the interesting little applet that tells you more about your TrueType fonts under Windows 95.

If you haven't got yours yet, mail me again and I will make sure it gets to you this time. If you have got the file, either from me or from Microsoft's web site, then there's an Easter egg in it (see [screenshot, above](#)): first, install the TrueType Font Properties extension. Restart Windows so that it loads (ignore these if you have already installed the applet). Go to the Start menu, select control panel, fonts. Right-click on Times New Roman and select Properties. There's an extra tab called "TrueType Credits", with a pretty little cartoon.

While we're on the subject, here's another Easter egg which is designed for Word 6. I don't have Word 6.0, so any report of what it actually does would be appreciated...

1. Open a new document.



The TrueType font properties Easter egg

2. Select Record Macro under the Tools menu.
3. Create a macro named SPIFF and click on the OK box.
4. From the Tools menu again, select Stop Recorder, then Macro and click on SPIFF.
5. Select Edit and delete the Sub Main and End sublines.
6. Under the File menu, select Close and click on Yes.
7. Go to the Help menu, select About and click on the Word logo.

Questions and queries

Just to keep you happy if you're not a Microsoft user, I've been saving up my Word Pro and Ami Pro queries for an occasion like this. So I'm afraid if you have a Word or WordPerfect problem, it isn't answered this month.

● Hanging around

James Rivers mailed me from Nottingham to ask whether his Word Pro installation had messed up his hard drive. Having compressed his hard disk using Stacker, he had just enough room to install Ami Pro. It didn't work: the install routine hung when he ran out of disk space. He deleted some files and tried again, but now he has a stray directory of files called Lotustmp.000. Was his installation okay? Was there a fault with the install routine?

Yes and no. The stray directory was a

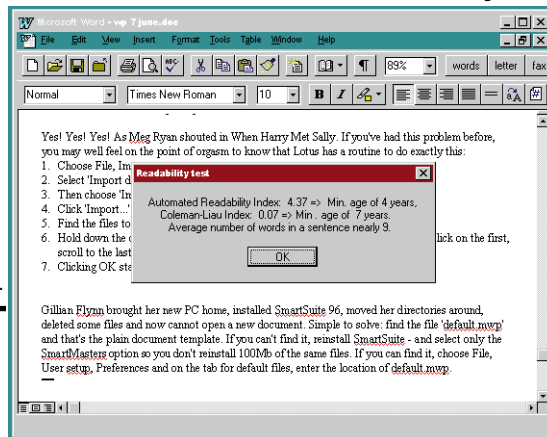
Mind your grammar

● Petr "PePa" Pavel from the Czech Republic not only wins the "Nickname of the Month" award, but also advances the debate on grammar checking. His Word 6.0 macro checks a document and gives figures for the Automated Readability Index and Coleman-Liau Index, plus the average number of words in a sentence (see Fig 2).

```
Sub MAIN
ViewNormal          ' not necessary but it raises speed
Dim dlg As FileSummaryInfo
FileSummaryInfo .Update
GetCurValues dlg
StartOfDocument
NumSent = 1 - Val(dlg.NumParas)
While SentRight() = - 1
    NumSent = NumSent + 1
Wend
NW = Val(dlg.NumWords)          ' number of words
WS = NW / NumSent              ' average number of words in a sentence
D = WS - Int(WS)              ' decimal part of it
W$ = " nearly"
If D > 0.5 Then
    W$ = " over"              ' is bigger than 0.5
EndIf
If D = 0 Then
    W$ = ""                  ' is integer
EndIf
WSD$ = Str$(Int(WS))
ARI = 4.71 * Val(dlg.NumChars) / NW + 0.5 * NW / NumSent - 21.43
ARI$ = Str$(Int(100 * ARI + 0.5) / 100)
AGE$ = Str$(Int(ARI + 0.5))
CL = 5.89 * Val(dlg.NumChars) / NW - 0.3 * NumSent * 100 / NW - 15.8
CL$ = Str$(Int(CL + 0.5) / 100)
AGECL$ = Str$(Int(CL + 0.5))
MsgBox "Automated Readability Index: " + ARI$ + " => Min. age of " +
AGE$ + " years," + Chr$(10) + " Coleman-Liau Index: " + CL$ + " => Min . age of
" + AGECL$ + " years." + Chr$(10)
+ " Average number of words
in a
sentence" + W$ + WSD$ + ".",
"Readability test"
End Sub
```

It gives a neat dialogue for the minimum reading age for any piece of text. You have to be at least seven years old to read this, according to Petr's macro.

The Czech Republic's contribution to this month's page: the eastern Europeans are providing my little club with some memorable macros



leftover from the first install routine, which uses a temporary directory to which to copy the compressed files before decompressing them. When the routine hung, this directory was left. Delete it with no risk whatsoever. There's not a fault with the install either: when a compressed disk claims to have a certain amount of space on it, that's an estimation based on how well it can compress files when it stores them. Program files do not compress well, so you may find install

routines being over-optimistic.

A final tip: word processors need much memory and less processing power. When your hard disk is full, there's no space for a swap file. Your word processor will run very slowly.

● An open and shut case

David Boyle, in Southampton, wants to import hundreds of Word documents into his shiny new Word Pro. Can he do it without opening each one? Yes! Yes! Yes! As Meg Ryan shouted in When Harry Met

Sally. If you've had this problem before, you may well feel on the point of orgasm to know that Lotus has a routine to do exactly this:

1. Choose File, Import.
2. Select "Import data from another application".
3. Then choose "Import and convert into Word Pro documents".
4. Click "Import...".
5. Find the files to be imported using the dialogue box.
6. Hold down the control key while clicking on all the files you want to convert. Or click on the first, scroll to the last, hold down shift and click on it — that selects all files.
7. Clicking OK starts the batch process.

● Get Smart

Gillian Flynn brought her new PC home, installed SmartSuite 96, moved her directories around, deleted some files, and now cannot open a new document.

It's simple to solve: find the file "default.mwp" and that's the plain document template. If you can't find it, reinstall SmartSuite and select only the SmartMasters option so you don't reinstall 100Mb of the same files. If you can find it, choose File, User setup, Preferences, and on the tab for default files, enter the location of default.mwp.

● At your command

Finally, there are some of you that don't even use Windows! I know about this because you write to me about how the concept of a GUI is a terrible plot foisted on us by Microsoft, Apple and the other spawn of the devil. I have two pieces of advice:

1. Wear a hat lined with aluminium foil, or Bill Gates will beam his thoughts into your brain.
2. If you want to find the text contents of binary (non-text) files, then from the command prompt,

use SCAN. The syntax is

```
SCAN < [filename] | MORE
```

To produce a printed list of all the commands in the file, type

```
SCAN < [filename] > PRN
```

Try it with Command.com. 

PCW Contacts

Contact **Tim Phillips** by surface or airmail to PCW, otherwise email him at his new CIS address **CompuServe 104047,2750** or **wong@cix.compulink.co.uk**



Name dropping

Stephen Wells creates a drop-down list of names for automatic addressing, and looks at Add-Ins for Excel.

Following all the exotic applications for spreadsheets described by readers this year, it's refreshing to receive a request for a bread and butter requirement.

Andy French emails: "I have been asked by a friend to create an invoice spreadsheet. He would like a drop-down list containing his customers' names so that he can click on a name and the address will be automatically entered. Additionally, he would like to be able to enter addresses manually, so I have also created an invoice list for him which stores the invoice details, but I would like to delete entries of a certain age and move the remaining entries up to fill the empty cells."

Right, then. Let us begin with the data list. Whether this is off to one side of the invoice on a separate worksheet, stored in another file, or even in another application such as Access, the principle remains the same.

For this example we will enter the company name, address, town, county, postcode, and phone number in columns A through to F respectively from Sheet 1, which we'll rename; Customers.

- The first seven customers will be on rows 7 through to 13 — mark this whole range, plus a row,

`A7:F14`
and name it Customerlist.

- Insert the appropriate labels (Name, Address, etc.) in cells A6 to F6.

- Also mark the range

`A7:A14`

and name it Company. These are the

presently listed company names, plus a row.

- Now rename Sheet 2; Invoice. Name the cell L1 on that; Current.

- Refer to Fig 1 and insert

`=Customers!A6` in cell B4,

`=Customers!B6` in cell B5

and so on.

The top of the invoice itself you lay out to match your other stationery. In Fig 1 I've added a few arbitrary borders and colour patterns to show an example. In use, you would hide the row and column headers but they are shown here for explanatory purposes.

To create the pick list, first right-click on the Standard Toolbar and left-click on Forms, to display the Forms Toolbar. I'm using Excel 7 but there is nothing here which can't be recreated in Excel 4 or 5. Click the Drop-Down button on the Toolbar and drag a rectangle on your worksheet in an area like F3 to H4 (it's not

critical because you can resize the box and move it later).

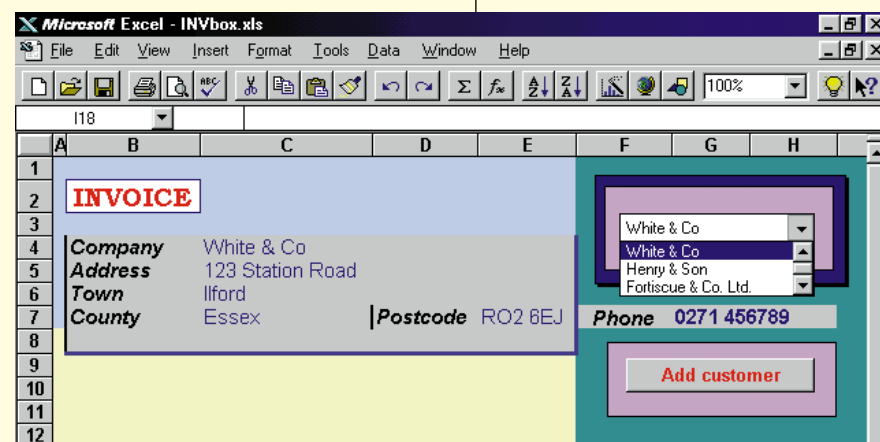
You now have an empty box with an arrow. Right-click on the box and choose, Format Object, Control, Input Range and enter Company. In the box below, labelled Cell Link, enter Current; and next to Drop Down Lines initially enter 3. This means when you click on the name in the box, or the arrow, three names will drop down and appear, as shown in Fig 1.

At this point, you now have the drop down list of customer names. The two colour panels behind it are simply Filled Rectangles produced with a click of the right button on the Drawing Toolbar.

The next job is to automatically make the correct address details appear once a name has been selected. My philosophy is never to write macro code when Excel formulas and functions will do the job. They'll always run faster than Visual Basic, anyway. Here, we can do the job with one simple function. No, not the universally loved LOOKUP, but INDEX.

In its basic reference form (there's also an array form but we don't need that here) INDEX has three essential parameters: the reference, a row number and a column number. A fourth, optional parameter is called area but, again, we don't need it here. The way in which we're using the function here is that we're saying the

Fig 1 On an invoice, it's easy to add a Drop-Down text box for selecting existing customers



reference is the range covered by the name, Customerlist. The row number is dictated by cell L1 (see above) which we've named Current because it names the number of the current customer. The column number on the Customers worksheet is 1 if we want the company name, 2 for the address, 3 for the town, and so on up to 6 for the phone number.

Right, now we're in business. To put the selected customer's company name in cell C4 we enter

`=INDEX(Customerlist,Current,1)`

In use, this cell simply repeats in the printing area whatever customer name is showing over in the Drop-Down box. You don't have to enter anything in cell L1. The DropDown Object will automatically put in it the number of the selected company. So if you pick the first name in the list, L1 will display 1. If you pick the sixth name in the list, L1 will show 6.

To put the address in cell C5 we enter

`=INDEX(Customerlist,Current,2)`

The town goes in C6 using

`=INDEX(Customerlist,current,3)`

and so on to

`=INDEX(Customerlist,Current,6)`

which puts the phone number in G7.

Once everything's working well, this worksheet can be saved as a template because this is an ordinary worksheet and no macros are involved.

If the user wants to enter an address manually, as per Andy's second request, he can simply click the Address tab, insert a row and type the details in: or choose Data, Form and a ready-labelled dialogue box would be created automatically, (Fig 2). It displays the same labels as in the headings row 6.

You could also add a button like the one labelled "Add customer" in Fig 1. It can be created automatically from the Forms Toolbar as easily as the DropDown box. If this button starts a macro with the line Worksheets(1) ShowDataForm in it, it would do the same job as turning to the Customers worksheet and choosing Data, Form.

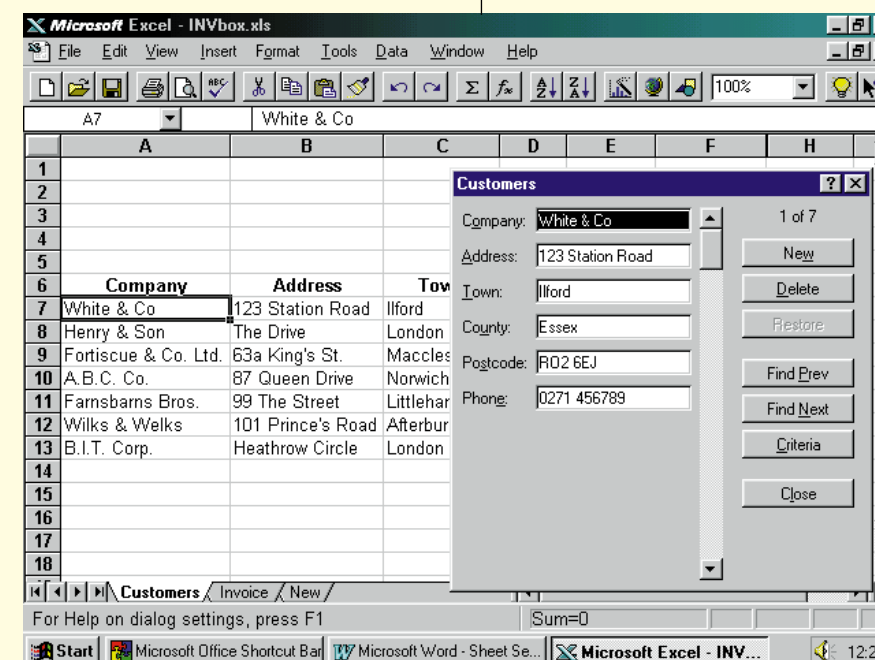
As to Andy's request for a way to clean up a list of recorded invoice details, I'd recommend Excel's AutoFilter. The list must have column labels like company, date of invoice etc. Select a cell in the list. Click Data, Filter, AutoFilter. Click the arrow in the column containing the data you want to filter and then, Custom. In the first box, click the arrow and pick the < (less than) sign. In the second box, choose a date (from the presented list of dates in the column). Once the list has been filtered, delete the rows (records) you wish to eliminate. Or, you could just print the reduced list of invoices and then redisplay the full list if you wanted to keep them on file.

Making it simple

You may recall in the June column that I wrote about a materials resource planning spreadsheet used by a Welsh medical products company. It calculated the component parts which would be needed in a period for assembling the company's products. The key formula was

`=SUM((L$6*C16)+(L$7*D16)+(L$8*E16)+(L$9*F16)+(L$10*G16)+(L$11*H16)+(L$12*I16))`

Fig 2 Choosing Data, Form automatically creates a dialogue box using the labels from the column headers



I commented in passing: "I can't help thinking there should be some way of multiplying named ranges as an array and simplifying that formula."

During the few days following publication, my email box filled up as suggestions came in. For all of them, note that an array is entered by pressing [Ctrl]+[Shift]+[Enter].

One proposal was from Peter Forty who suggested assigning the name month1_prod to the range \$L4:\$L\$12 and then using two functions in this formula:

`=SUM(C16:I16*TRANSPOSE(month1_prod))`

At first, I couldn't get this to work. But then I realised the arrays were of different lengths. When I trimmed the named range down to \$L4:\$L\$12 the formula worked fine. Both arrays now referred to seven cells. If you're not familiar with TRANSPOSE, what it does is shift the orientation of an array from vertical to horizontal and vice versa. Just the job, here.

Paul Bloomfield suggested a variation that eliminates the multiplication sign:

`=SUMPRODUCT(C16:I16,TRANSPOSE(L$6:L$12))`

Paul also suggested

`=MMULT(L$6:L$12,C16:I16)`

but I couldn't get it to work properly. Pity, really, as he told me that his name had first appeared in PCW in 1981. I was deeply impressed.

Then I received a lengthy email from James Talbut, in Belgium. He firstly pointed out that there was a redundancy in the original. You can either use the plus signs or the SUM function, but you don't need both — quite right. Then he suggested all of the above formulas and his version of the MMLT function worked. He wrote it as

`=MMULT(C16:I16,L$6:L$12)`

So did Jim Tavendale of Horndon-on-the-Hill which, if you don't know this charming village, is between Mucking and Ockendon, in Essex.

I couldn't understand why the formula worked one way around yet not the other. The Function Wizard in Excel 7 makes no distinction between the arrays. Then I checked in the indispensable Function Reference book which is Volume 3 of the Excel 4 documentation and found that the first array refers only to columns and the second array to rows.

So, grateful as I am to the other loyal and helpful readers, for accuracy, comprehensiveness and speed of response, the prize must in all fairness go to James Talbut: if you could send me your postal address, James, I'll arrange for a book token, or equivalent, for overseas winners.

Finding a data entry

Microsoft's Excel development team has introduced four new Add-Ins. They are compatible with Excel 7 and the Mac, Windows 3.x, and Windows NT 3.x versions of Excel 5. You can download them from <http://www.microsoft.com/msexcel>; or Go MSEXCEL on the CompuServe Information Service.

The File Conversion Wizard will be popular, considering the amount of mail I receive on the subject. There is an internet Assistant Wizard which converts Excel data into an HTML table and a Conditional Sum Wizard, which helps you create SUM-IF formulas.

But the Add-In which I suspect will appeal most of all to readers of this column is called the Lookup Wizard. What it does is to create a formula which finds the value at the intersection of a column and a row.

An example is shown in Fig 3. Column A has a series of date entries. Rows B through E represent regions with their labels in row 1. The block B2: E10 has simple numerical data entries. After installation, the Lookup Wizard will be found listed at the foot of the Tools menu.

In Step 1 you enter the range to search. In this case it's A1:E10. If you mark this range before starting the Wizard, the "Range to search" box will already be filled in.

Step 2 is shown in the illustration (Fig 3). It offers drop down lists of the row and column labels. I've selected the date which is the label for row 8 and the East region which is the label for column D.

Step 3 offers a choice: you can either copy the lookup formula to the worksheet; or you can copy the formula and the

EXCELent shortcuts and longshots

● **New folder:** you don't have to use Explorer or File Manager if you want to open a new folder before you save a file in Excel 7. Just choose File, Save As, and then hover the mouse over the offered buttons until "Create New Folder" appears. Click that button and enter the new folder's name. Click Save.

● **Fancy backgrounds:** you can dress up your displayed worksheets (and your hard copy, too, if you have a colour printer) by choosing Format, Sheet, Background. Select any directory with graphics files in it and pick your preference. Such backgrounds look best if you also choose Tools, Options and empty the Gridlines box under the View tab.

● **Absolutely:** if you press the F4 key before ENTER when entering a relative cell reference it will change automatically to an absolute reference. Example: C4 becomes \$C\$4.

● **Save memory and disk space:** by initially opening your workbooks with fewer sheets. Choose Tools, Options, General,

"Sheets in New Workbook". You can easily add sheets as you need them by right-clicking on a sheet tab and selecting Insert, Worksheet.

● **Writing macros:** as easily as you can insert functions on a worksheet using the Function Wizard, you can insert object names on a module sheet. Just click the Object Browser button on the Visual Basic Toolbar. Then select Excel under "Libraries/Workbooks". Following the selection of an object in the "Objects/Modules" list box you can view all the properties and methods for that object in an adjacent list box. Choose one and click the Paste button — it's immediately copied into your macro.

● **Imported data:** can easily be divided into columns using the Text to Columns Wizard. Whether the data is separated by commas, semicolons, tabs or any other delimiter which you specify, Excel will cut it up into columns for you. Select the cells to convert. Choose Data, Text To Columns. Specify how you want the text divided into columns.

values of the lookup parameters. This allows the values of the lookup parameters to be changed on the worksheet without running the Wizard again.

If you take the first option, then in Step 4 you simply specify which cell is to contain the formula. If you plump for the

second option, you still pick one cell but the Wizard will also use the next two cells for the lookup parameter values.

The Wizard wigs out

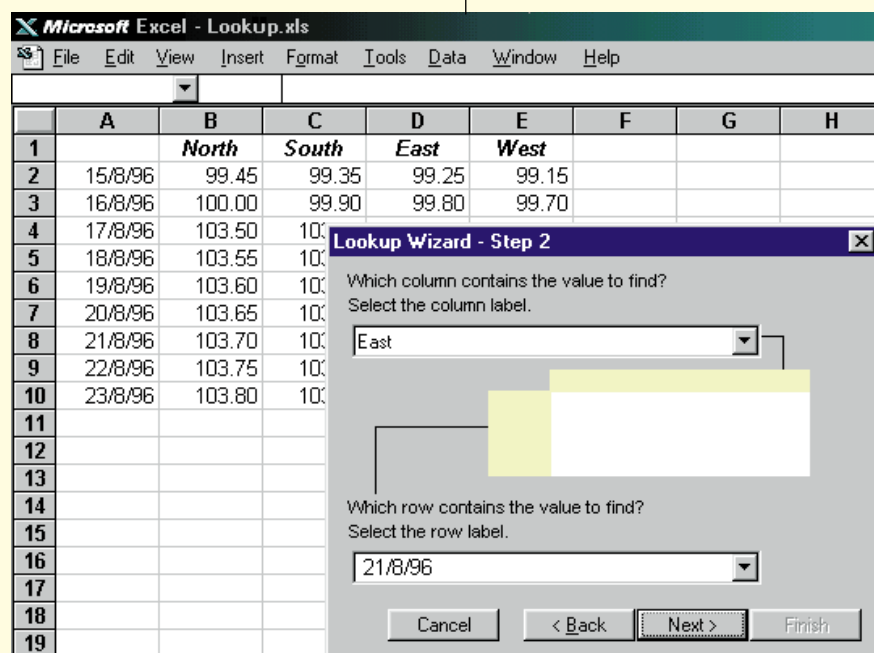
Actually, this is how it's *supposed* to work but in fact, after Step 2, I couldn't get past an error message box that stated: "The cell found by the Wizard contains a formula returning an error. Please exit the Wizard and fix your table." The fact is, my table didn't contain any formulas so what the Wizard's problem was, I do not know. Hopefully, by the time you read this and have downloaded the Add-In, Microsoft will have had the bug sorted out.

However, all the Wizard does with choice 1 is to write a formula which you can enter yourself in the cell of your choice. First, make three Names. Call A1:E1 Columns. Call A1:A10 Rows. Call A1:E10 Table. To reproduce the value for East on 21/8/96 in, say, cell F15 then in that cell you enter this formula:

```
=INDEX(Table,MATCH(DATEVALUE("21/8/96"),Rows,),MATCH("East",Columns,))
```

And that should solve the problem.

Fig 3 *The new Lookup Wizard Add-In will find a value at the intersection of a column and row*



PCW Contacts

Stephen Wells welcomes comments on spreadsheets, and solutions to be shared, via PCW Editorial at the usual address or at Stephen_Wells@msn.com. Files can be attached if you are on MSN.



Fresh fields

Mark Whitehorn comments on areas of Microsoft's internet strategy relating to the future of DBMS. Plus, the TechNet troubleshooter CD-ROMs.

I have just returned from Microsoft's Tech Ed conference where Microsoft's internet strategy was much discussed. There are two areas of said strategy which are likely to be of major interest to DBMS fans.

The first is the rocketing growth in tools which provide web access to databases. Tools for Microsoft's Access and SQL server have already been released and the next six months will see rafts of the things appearing. What makes all this doubly exciting is that being a new field, there are no standards or yardsticks for comparison. So, for a while, we are all going to live in interesting times.

The second issue concerns the way in

which all the data is controlled on the Internet. At Tech Ed I discussed this with Microsoft's Brad Silverberg (senior vice president, Internet Platform and Tools division), and he used Microsoft's TechNet (see *overleaf*) as an example. The data in TechNet isn't organised as a classical relational database; instead, it is mostly text and is organised more like a huge hypertext help system. This is currently distributed as a set of three CD-ROMs which are sent to each subscriber on a regular basis.

He said that this type and quantity of data should be on the Internet. We might envisage a situation where the data was originally distributed on CD-ROMs to

each subscriber, transferred to writeable media and then subsequently updated from a web site. The problem, as Brad pointed out, is that this huge volume of data is not only expanded month by month, but additionally the existing data is edited and updated. Currently there are no standards on the internet for flagging changes to data with time, so working out a system for downloading just the changes is a nightmare.

Well, there may be no standards on the Internet, but this problem has been well understood in the database world for years. In fact, it is a small and relatively simple subset of the problems which can occur when data is replicated across two

or more sites. All of which suggests to me that we can expect to see two distinct changes over the next few years.

Currently, web sites store essentially static data. As tools become available to tie RDBMSs to web servers, we will rapidly move to a situation where web sites display mainly static data with some embedded dynamic data which will come from an RDBMS. Some sites already do this. However, I don't think we'll stop there.

The web is going to become the repository for mind-bogglingly huge amounts of data. Unless that data is properly organised, it will rapidly become unmanageable. I believe that we will shortly see tools arriving which combine RDBMS and web server functionality. This combination will be conceptually very different from linking because the RDBMS will take over the management of *all* the data that the server presents to the world. With a tool like that, management of the information in TechNet will be simple.

The good news is that it looks like our databasing skills will be needed for many years yet, solving all of these new database problems.

In-flight databasing

I was both interested and exasperated to find myself beset by another database problem on my return journey. It was the old story: breakfast in Nice, lunch in Edinburgh, luggage in limbo. I didn't see it again until the following day. The enforced separation from my dirty socks for 24 hours didn't worry me; what concerned me was the cavalier manner in which airlines use, or do not use, the information they hold.

Airlines manage massive amounts of

information about discrete items of data: passenger details, seat allocations and luggage details. For years they have managed to control the passenger and seat allocations reasonably well (failure to do so creates fist fights in the aisles, which are bad for PR). The control of luggage was traditionally less well implemented until the arrival of terrorist activities. It is now, shall we say, "politically incorrect" for an airline to be uncertain of the whereabouts of a given piece of luggage.

Many of us have been held inside a stuffy aircraft while the airline tries to find that last elusive passenger and tells us that, unless he or she is found, the entire luggage hold will have to be eviscerated. I have never complained, because it tells me that the airline knows which pieces of luggage are on the aeroplane and I'm duly grateful: by extrapolation we can assume that it also knows which luggage *isn't* on board.

So the database problem is easy. You know which passengers are in which seats, and which are unlucky enough to be parting from their luggage at 500 knots: it should only be a trivial task to send the aircraft, in flight, a list of those hapless passengers so that they can be informed before arrival.

What actually happens is that you, rather than the airline, do the database work. You hang around querying the carousel until it returns a null; in my case, this took about half an hour. Then you submit a query to the baggage reclaim server, only to discover that there is a FIFO (First In First Out) queue and you are L (Last). When your query reaches the head of the queue, you discover that the server performed a replication with London some

On my bookshelf

The SQL Server Handbook — A Guide To Microsoft Database Computing, by Ken England and Nigel Stanley.

Covers SQL Server version 6.0, and although 6.5 has just arrived, a large proportion of the book is still relevant. Database servers are substantially different from PC RDBMSs, so for the many people who are currently moving up, such a book has to be well worth considering.

The authors avow that it is "definitely not intended to be a re-hash of the documentation set", which is certainly true; instead the book concentrates on the working principles behind SQL Server.

Thus, instead of simply telling you *how* to create a device, it explains *what* a device is, and why you need them. The subject areas covered range from devices, through data

integrity and database concurrence, to database administration and integration with Access and VB.

In general, the book is well laid out and readable. I had only two real criticisms. Firstly, it tends to favour the command line. For example, we are told that a device can be created using TRANSACT-SQL (after first using "sp_helpdevice" to identify an unused device number). The syntax is:

```
disk init
name = 'authors'
physname = 'c:\sql\data\aut.dat'
vdevno= 2
etc...
```

After all that, there is a brief note that using the GUI tool SQL Enterprise Manager will, among other virtues, locate an unused device number for you and specify it

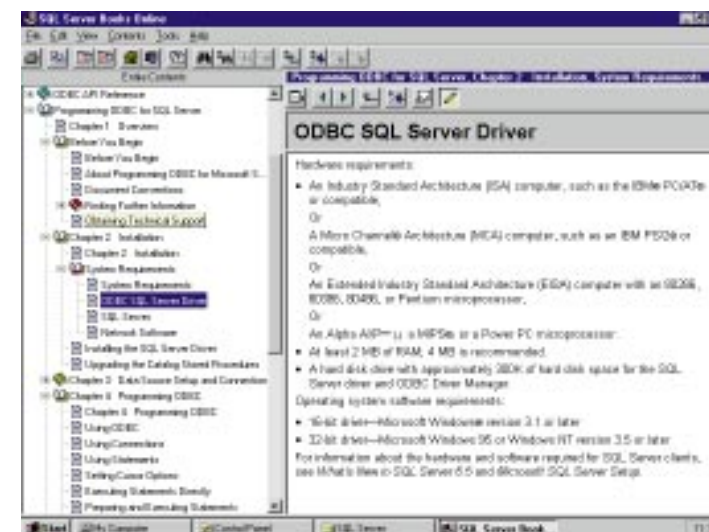
automatically. I don't know about you, but I'd choose a GUI tool any day.

Secondly, there isn't enough text devoted to the mechanics of driving a server. For example, in the above section, we are told that we "need to obtain a device number using the system procedure 'sp_helpdevice'". What the novice user *isn't* told is how or where to issue that command.

Nevertheless, this book offers an invaluable background. Considering the amount that you will be spending on the server, the expense must be worthwhile.

● **The SQL Server Handbook — A Guide To Microsoft Database Computing** by Ken England and Nigel Stanley. Digital Press, ISBN 1 - 781555 - 581527. Available from ICS Solutions (01256 469460). Price £29.99.

On my bookshelf



The online help in SQL Server is as good as online help ever seems to be, which is why a text-based book is still desirable

time ago and already knows about your luggage... ARGHHH! Let's use the technology properly, guys.

TechNet troubleshooters

For those who haven't come across it yet, Microsoft has compiled an excellent source of information onto a series of three CD-ROMs entitled TechNet. They're a mine of troubleshooting information about a range of Microsoft products. Be warned, though; it takes a pretty hefty outlay for access to this resource (see PCW Contacts, page 273).

The extracts which follow give a flavour of the kind of information you'll find:

Q. When I add two tables to my query that

do not have a defined relationship, Microsoft Access automatically joins them. Can I prevent this from happening?

A. Microsoft Access 2.0 automatically joins two tables in a query if the tables meet the following criteria:

- There is no relationship defined between the tables.
- Each table contains at least one field whose name and data type matches the name and data type of a field in the other table.
- One of the tables has a primary key defined on the matching field.

Only one AutoJoin is automatically created between two tables. Even if there is more than one join possible between the two tables, a join is created only between

the first fields that meet the above criteria. If you add three tables that meet the above criteria to a query, three joins are created; one for each table pair. You cannot turn off this functionality: you must either delete the join line after it has been created, or manually define a relationship between the two tables.

Q. Why can I update more fields in my query than I could in Microsoft Access version 1.x?

A. In Microsoft Access 2.0, when a query includes fields from more than one related table, you can update data on both sides of the join. This means that in a query which combines data from two tables, you can update data from both of those tables.

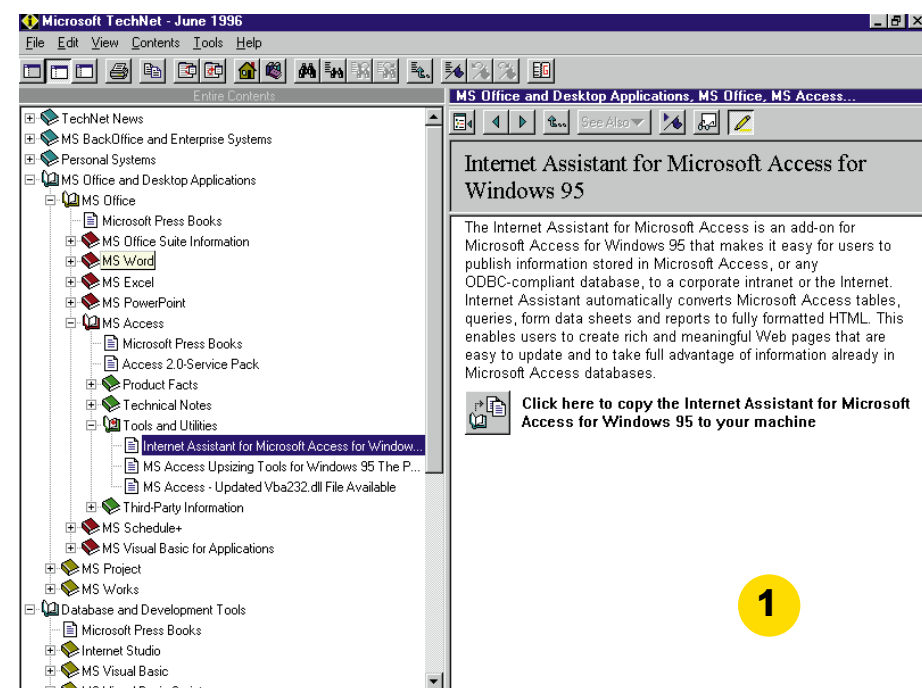


Fig 1
In full swing: you can use this to download new and exciting add-ons which are supplied on the TechNet CD

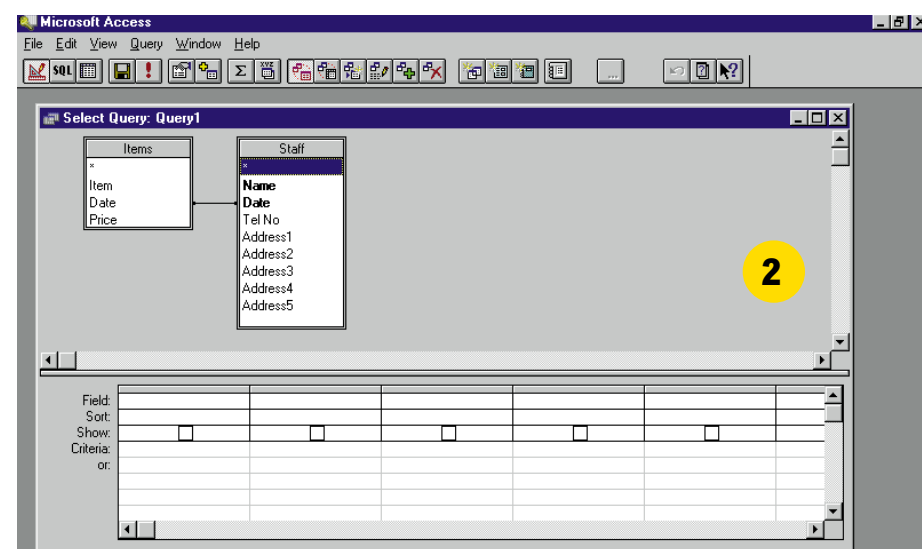


Fig 2
TechNet is also a source of riotously interesting information

Fig 3
The behaviour described in the first extract from TechNet — Microsoft Access, making joins between tables in a query. In some cases (such as this) the assumptions it makes may not be exactly what you had in mind

If you want to prevent users from updating fields in a multiple-table query, create a form based on the query and then set the Locked property for the fields you do not want users to update.

Q. Why do I see a number instead of "(counter)" for my counter field?

A. Microsoft Access 2.0 enters a counter value when you start to edit a new record. In Microsoft Access 1.x, this value was entered after you saved the record. Since this value is now provided earlier, if you start editing a new record and then cancel it, the counter value is still used even though no record is stored with the value. For example, when you add a new record to a table containing two records, the counter value is three. If you cancel this new record and later add another new record, the counter value is four for the new record.

Counter values are not re-used when you delete records. For example, if in a table of 15 records you delete the last three records and then add a new one, the counter value for this new record is 16. To reset the next available counter value, compact the database. After the database has been compacted, the next available counter is set to one higher than the last counter value in the table.

Q. Why is the data sorted in my query but not in my report?

A. Reports create their own internal queries to present the data. If you want to present the data in your report in a particular order, you must set the sort order explicitly in the Sorting And Grouping

dialogue box. To do this, open the report in Design view and then choose Sorting And Grouping from the View menu.

Q. How can I keep a group of records together in a report?

A. The new KeepTogether property for groups in Microsoft Access version 2.0 gives you the ability to keep groups of like information together. This property is available in the Sorting And Grouping dialogue box for reports. Using this property, you can keep an entire group together (including the group header, all records and the group footer), or keep the group header with the first record.

Q. Why is every other page of my report blank, and how can I correct this problem?

A. The problem occurs when the total width of your report exceeds the width of the paper specified in the Print Setup dialogue box. For example, blank pages print if your report form is 8ins wide and your left and right margins are 1in wide for a total width of 10ins, and if the paper size specified in the Print Setup dialogue box is only 8.5ins wide.

Using this example, if controls (such as text boxes) extend beyond 8.5ins, the controls are printed on a second page. Otherwise, you receive a warning message stating that some pages may be blank. Blank pages generated after the warning are not counted in the total pages of your report.

Windows

The following information applies to

Micro-soft Access versions 1.0, 1.1, 2.0 and 7.0:

Symptoms: Using a make-table (SQL Select...Into) or an append (SQL Insert...Into) query with criteria that have no matching records, causes an empty table to be created. In Microsoft Access versions 1.x and 7.0, if the empty table contains a counter field, the first record added to the table will have a counter value of one. In Microsoft Access version 2.0, the first record added will have a counter value of two.

Cause: Microsoft Access version 2.0 provides the first value for auto-increment fields internally. Because it provided 1 internally for the previous auto-increment column, the next value is 2, which shows in the new table.

Resolution: In version 2.0, create the table manually, instead of using a make-table query or append query, to start the counter at 1.

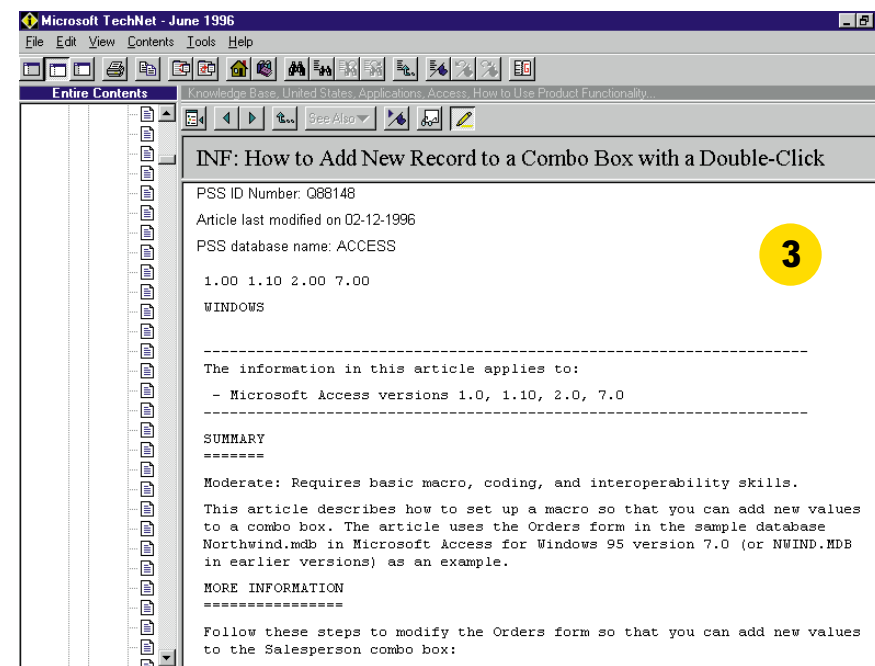
Status: This behaviour is by design.

Steps to Reproduce Behaviour:

1. Open the sample database Northwind.mdb (or NWIND.MDB versions 1.x and 2.0).
2. Create a new query based on the Employees table.
3. On the Query menu, click Make Table. Enter "Empty Table" (without the quotation marks) in the Table Name box, and then click OK.
4. Drag the EmployeeID and LastName fields to the QBE grid.

(Note: In versions 1.x and 2.0, there is a space in the field names Employee ID and Last Name.)

5. In the Criteria row for the EmployeeID column, enter "<1" (without the quotation marks).
6. Run the query. Note that a new, empty table called Empty Table is created.
7. Open the Empty Table table and enter a name in the LastName field. Note that the counter starts at two instead of one in version 2.0. In versions 7.0 and 1.x, the counter starts at one, as expected.



PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's at m.whitehorn@dundee.ac.uk

MS TechNet costs £249 per year for a single user; £550 per year for the server-based version with unlimited access. (Both prices excl. VAT). 0800 281221



A real sun trap

Terence Green suffers over-heating and CPU traps, serves up some cool tips, and chills out to some Merlin and DBExpert 2.0 applications.

It very nearly was a flaming June when my Warp Server system started to act up right after the summer arrived. First thing I knew was that I'd lost the connection to the server, so I went to see what had happened and heard an awful grinding noise. Fearing the worst, I opened the lid and discovered to my amazement that the cheapo plastic fan on top of the Pentium CPU was the source of the noise.

I replaced it with a ten quid replacement from Maplin and restarted the server, but all was not well. Things crashed left and right and the dreaded Trap screen was invariably no more than a few minutes away from each boot. Fortunately, I have a list of the CPU Traps and it soon became obvious that they were all software-based — Trap 0006, Trap 0008, Trap 000E and so forth (see the general list in Fig 1, alongside).

I decided to restore the system from backup, and since then all's been well. The moral of the story is to be really careful with hot systems, especially when the temperature changes rapidly as it did at the beginning of June.

I moved my main server from NetWare 3.12 to Warp Server several months ago and I've thus far been pleasantly surprised. Performance is excellent and Warp Server is very easy to administer through the graphical administration utility. It's also a great file and print and application server for OS/2, DOS, Windows 3.x, Windows 95 and Windows NT clients, and the integrated systems management and backup tools are the most comprehensive among comparable network server packages.

OS/2 applications

In the August issue, I said that I'd mention some new and updated applications for OS/2, but having asked several vendors for review

copies, only two turned up. Depressing, really, but at least the two that did turn up were worth a mention.

DBExpert 2.0 is a really nice, inexpensive database from Designer Software. It's easy to use and it supports forms, reports and macros, and works out of the box with dBase, Clipper, FoxPro and FoxBase tables. It will also work with DB/2, Oracle 7, SQL/400 and SQL/DS databases.

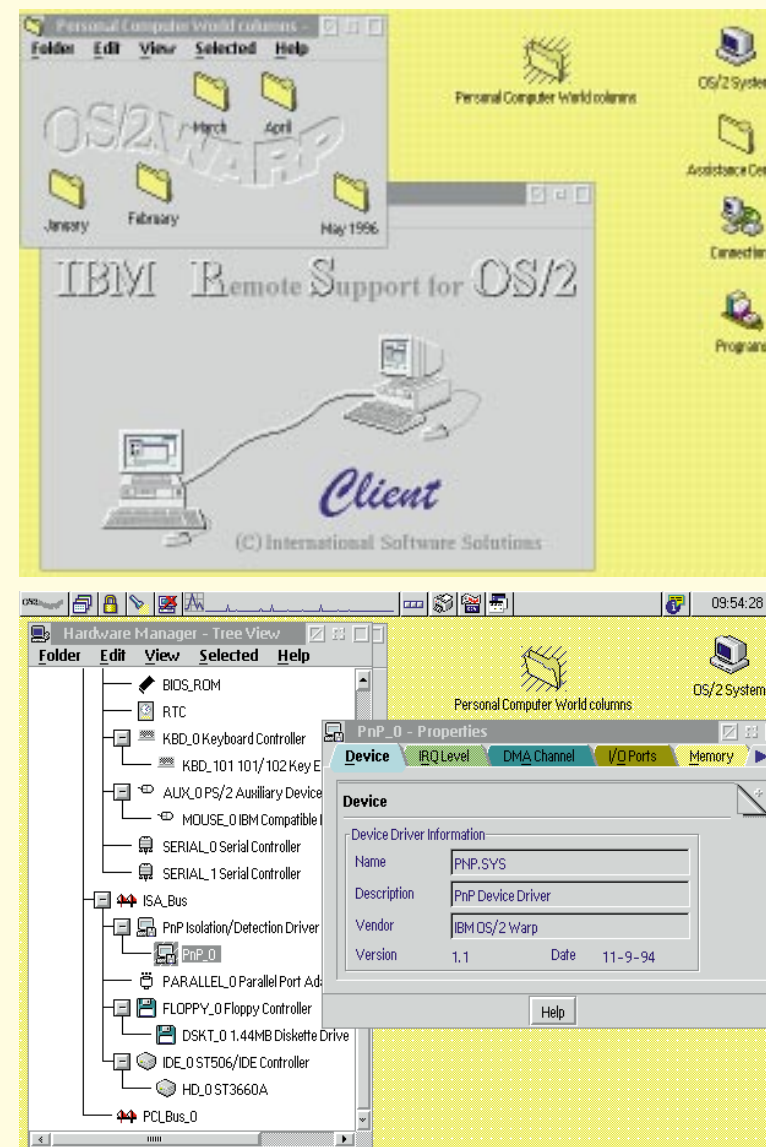
Meeting Maker XP from ON Technology is the other OS/2 product that turned up. This is a really neat cross-platform group scheduler. Meeting Maker started on the Macintosh and is now also available OS/2, DOS, Windows and Unix systems. It supports MAPI and TCP/IP so you can use it for scheduling over the Internet with remote locations, and with other MAPI-based email applications.

Merlin

Merlin is now in beta (*please let this be true by the time this appears in print!*). The

Fig 1 A general list of OS/2 traps

TRAP 0000	DIVIDE ERROR.	A program attempted to divide a number by zero. Contact software support.
TRAP 0001	DEBUG EXCEPTION.	Contact software support.
TRAP 0002	HARDWARE/MEMORY ERROR.	Memory or hardware failure in the system. Contact hardware support.
TRAP 0003	BREAKPOINT.	This is a special instruction (INT3) used in "debugging" software, which was left in the code either accidentally or by design. Contact software support.
TRAP 0004	OVERFLOW.	An overflow occurred while doing an arithmetic operation. Contact software support.
TRAP 0005	BOUND RANGE EXCEEDED.	A Bound instruction exceeded the specified limits. Contact software support.
TRAP 0006	INVALID OP CODE.	The processor tried to execute an unreserved invalid opcode. Contact software support.
TRAP 0007	CO-PROCESSOR NOT AVAILABLE.	If CO-PROCESSOR diagnostics run error-free. Contact software support.
TRAP 0008	DOUBLE FAULT.	The processor detected an exception while processing an exception. It could be caused by either hardware or software. If trap 0002 is also being experienced, contact hardware support.
TRAP 0009	CO-PROCESSOR OVERRUN.	The middle portion of a CO-PROCESSOR operand is protected or not-present. Contact software support.
TRAP 000A	INVALID TASK STATE SEGMENT.	A task switch to an invalid task switch segment was attempted. Contact software support.
TRAP 000B	SEGMENT NOT PRESENT.	The segment being referenced is not present. Contact software support.
TRAP 000C	STACK FAULT.	The page being referenced is not present in memory or the procedure referencing the page does not have enough privilege to access the page. Contact software support.
TRAP 000D	GENERAL PROTECTION EXCEPTION.	All protection violations which do not cause another exception cause a Trap 000d. Contact software support.
TRAP 000E	PAGE FAULT.	The page being referenced is not present in memory, or the procedure referencing the page does not have enough privilege to access the page. Contact software support.
TRAP 000F	RESERVED BY INTEL.	N/A
TRAP 0010	CO-PROCESSOR ERROR.	The processor detected an error from the CO-PROCESSOR. This could be caused by hardware or software.



Top, Fig 2 A remote support application will ship with Merlin so that help desk and OS/2 support personnel can dial in to the user's system and effect changes

Above, Fig 3 The new Hardware Manager in Merlin will support plug and play for the ISA bus, as well as on standard PCI plug and play systems

first limited beta drop happened in early June, with the second scheduled for mid-July. The mid-July beta is a wide, public beta described as an "early experience programme", and the final product, which now looks like being called Warp 4.0, should ship at the end of August.

With the inexorable rise of the internet and Java, it's good to see that IBM has once again been quick off the mark. Merlin will ship with Java support included in the operating system. A JIT (Just In Time) compiler, which will dramatically boost Java applet performance, is in beta now and should ship by the end of the year.

Merlin will include OpenDoc support as well (this has been available via the Developer Connection <http://www.developer.ibm.com> for several months now). OpenDoc is available on the Mac as

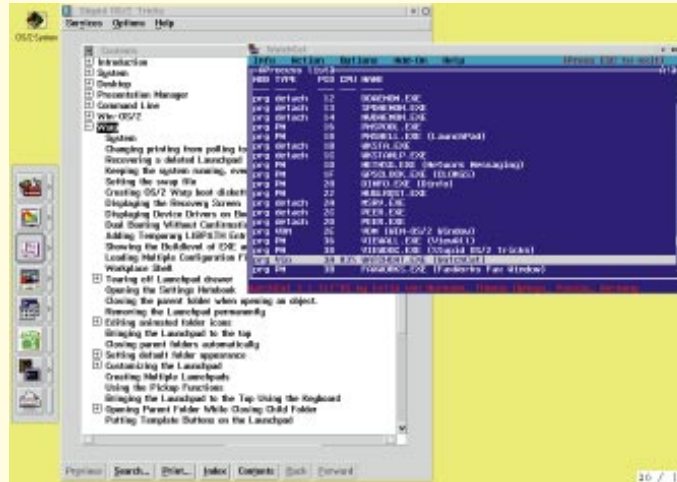
I write and should be in beta for Windows 95 and Windows NT as of early June. The significance of the conjunction between Java and OpenDoc is that OpenDoc provides a secure way of integrating Java applets into a wider framework. IBM's Arabica is an OpenDoc-based framework that allows Java components to be linked into more complex commercial business applications in multi-vendor networks; for example, linking clients into transaction processing systems.

There's so much going on at IBM to do with Java that it's hard to keep a handle on it. Best place to look on the Internet is the IBM Hursley site. Look at NetRexx for instance (this is a simple programming language combining the best elements of Java and Rexx), at <http://www2.hursley.ibm.com/netrexx>.

OpenDoc (<http://www.software.ibm.com/clubopendoc>) and Java are at the forefront of the move to component technology which can be implemented on many PC platforms including OS/2, Windows and Macintosh, but also on mid-range Unix and AS/400 systems and eventually on IBM mainframes, too.

Go to IBM's Warp information site for the latest on Merlin — it's easy to find from <http://www.software.ibm.com>. As well as speech navigation and dictation, Merlin includes support for OpenGL 3D graphics and for TrueType in OS/2 applications. TrueType in Win-OS/2 sessions is already supported in Warp.

Installation is much smoother now, and plug and play is supported. Problems can be tracked down with the Hardware Resource Manager (see Fig 3). Systems



WatchCat for OS/2 (included on our cover-mounted CD-ROM) can be used to find and destroy an application which has hung and blocked input. Stupid Tricks for OS/2 (also included) is anything but stupid

management is a priority in Merlin, and there are some excellent aids including AI-based configuration assistants called

WarpGuides: a remote support facility which will enable support personnel to dial in and diagnose problems on client workstations; and DMI support. Merlin is the first operating system with integrated support for the Desktop Management Interface. IBM has also extended the Software Updates feature of the TCP/IP applications suite so that Merlin users will be able to upgrade Merlin over the internet or LAN through a browser interface.

My screenshot of Merlin is taken from early code and I wasn't able to take the screen resolution beyond 640 x 480 x 16 because the video drivers weren't ready before beta distribution proper started. The reason for this is the new fully 32-bit graphics device interface. Called GRADD for Graphics Adaptor Device Driver it is designed to make video drivers easier for hardware manufacturers to write, by reducing the amount of coding required.

TG Tips

- Warp Server and the OS/2 Peer can browse multiple domains if you edit the "othdomain" line in the [requester] section of IBMLAN.INI which you can find in the x:\IBMLAN sub-directory. Add up to three the additional domain names separated by a comma.
- If you find that you're having problems printing with TrueType fonts from Microsoft Word or PowerPoint running in a Win-OS/2 session, make sure that the correct driver for your printer is installed.
- If you have a new keyboard with the three Windows 95 keys, and OS/2 flips when you hit one of these keys: install the drivers in "WINKEY01.ZIP", which I've included on the cover-mounted CD-ROM cover disc.
- Has your mouse left you? Shut down OS/2 from the keyboard by pressing Ctrl-Esc to open the Windows list, and choose the desktop. Press the spacebar to deselect any highlighted icon. Then press Shift-F10 to open the Desktop menu and select Shutdown.
- Looking for an inexpensive scanner that works with OS/2? Try the new Epson GT-5000. It doesn't have a native OS/2 driver yet but it works fine in an OS/2 Windows session. More importantly, Epson supports its use under OS/2.
- Need to keep OS/2 running even if it traps because you're running a BBS? Add these lines to CONFIG.SYS:
 1. REIPL=ON (automatically reboots after a trap).
 2. SUPPRESSPOPUIS=<drive>. This stops Trap data from appearing and logs it to POPUPLOG.OS2 on the selected drive.
 3. DUMPPROCESS=<drive>. This optional command causes a diagnostic process dump to be written to PDUMP.* on the specified drive.

Places to go, sites to see

- Developing database applications with DB2? Check out the Product and Service Technical Library on the World Wide Web at <http://www.software.ibm.com/data/db2/support/servinfo/index.html>
- Looking for the latest Warp updates? Go to the IBM Download library at <http://www.software.ibm.com/download>
- Need more detail on Internet options for OS/2? Wander over to <http://www.internet.ibm.com>
- A great source of OS/2 technical data can be found in IBM Red Books. They are written by IBM technical support people. They're available on CD-ROM, too, and not very expensive: the OS/2 library costs around £15. The Red Book site is at <http://www.redbooks.ibm.com/redbooks>
- Kris Kwilas' Highly Unofficial IBM OS/2 Beta FAQ is a good way of keeping up to date with the latest information and can be found at <http://www.students.uiuc.edu/~kwilas>
- Another useful site from which to search out OS/2 data is the CyberBlue OS/2 Online Exploration Guide at <http://www.cyberblue.com>

Software included on our cover-mounted CD-ROM this month:

- DINFO.ZIP: a useful system monitor.
- GPSCLOCK.ZIP: a small digital screen clock.
- TRICKS.INFO: OS/2 tricks (view with VIEW.EXE).
- TRIT32.ZIP: Triton Bus Master/PIO drivers for Intel 82430FX/HX chipset.
- WCAT21.ZIP: WatchCat 2.1 recovery program.
- WINKEY01.ZIP: Driver (for Warp only) for Windows 95 keyboards.
- WEB Explorer 1.1B.

PCW Contacts

Terence Green can be contacted either by post c/o PCW or by email to tgreen@cix.compulink.co.uk

DBExpert 2.0 from Designer Software, USA (970) 858 0200

Meeting Maker from ON Technology 01753 673220



Fraction action

Mike Mudge presents continued fractions — when are they periodic, and how long are the periods?

Definition: an expression of the form $a_0 + 1/(a_1 + 1/(a_2 + 1/(a_3 \dots)))$ is called a regular, or simple, continued fraction. Throughout this work a_r will denote positive integers. (a_0 may be zero.) The SIMPLE continued fraction numerically equal to any rational number (i.e. the quotient of two integers) must terminate. That is, have only a finite number of partial quotients a_r ; although such expressions have certain applications, including the design of gear trains, they have very limited appeal in computational or pure mathematics. For example, $105/38 = 2 + 1/(1 + 1/(3 + 1/(4 + 1/2)))$. To simplify this somewhat cumbersome notation, we write $105/38 = (2; 1, 3, 4, 2)$.

Theorem A. Look at *Continued Fractions* by A. Ya Khinchin (Phoenix Science Series, The University of Chicago Press, 1964). The necessary and sufficient condition for a simple continued fraction to be finite is that it represents a rational number.

Theorem B. *loc.cit.* above. The necessary and sufficient condition for a simple continued fraction to be periodic is that it should represent a quadratic irrational. That is, a non-integer real root of a quadratic equation: $ax^2 + bx + c = 0$ where a, b and c are integers, a not equal to zero.

● **Problem 1.** Write a simple computer program to generate the (finite) continued fraction corresponding to any given positive rational number, i.e. input p/q and output $(a_0; a_1; a_2; a_3, \dots, a_n)$.

● **Problem 2.** Write a simple computer program to solve exactly any given quadratic equation with integer coefficients, i.e. input a, b & c as in $ax^2 + bx + c = 0$ and output the roots as $P \pm \text{SQRT}(Q)$.

It is suggested that the reader now experiments with simple periodic

continued fractions such as $(0; 1, 1, 1, \dots)$, also $(2; 3, 4, 3, 4, 3, 4, \dots)$ to see the quadratic equation whose root they represent. Note in the first example, $x = 0 + 1/(1+x)$, while in the second example, $x - 2 = (0; 3, 4, 3, 4, 3, 4, \dots) = y$ say where $y = 1/(3 + 1/(4+y))$.

Hence, the desired quadratic equations and exact values for x & y can be found.

The more complicated experiment is to start with a given quadratic equation and determine the continued fraction expansion of any positive real roots which it may have. Note: these must be periodic; the analysis may be beyond the mathematical experience of some readers, but its omission does not affect the continuity of the rest of this discussion. Now restrict the quadratic equation to the form, $x^2 - a = 0$, and focus on the root $\text{SQRT}(a)$. In their paper *Some Periodic Continued Fractions with Long Periods* (*Mathematics of Computation* vol 44, number 170, April 1985 pp 523-532), CD Patterson and HC Williams used The University of Manitoba Sieve Unit (UMSU), "a machine similar to DH Lehmer's DLS-127", to investigate cases of long periodicity. Theoretically, they identified four classes of 'a' of interest: (1) $a \equiv 3 \pmod{8}$ 'a' prime; (2) $a \equiv 7 \pmod{8}$ 'a' prime; (3) $a \equiv 6 \pmod{8}$ 'a'/2 prime; and (4) $a \equiv 1 \pmod{8}$ 'a' prime. Denoting the period by $p(a)$, typical results in each of these classes are:

a 2186009851 2763423391 2340752254 18901431649

$p(a)$ 151838 170804 157036 433383

● **Problem 3.** Attempt to determine the period of the simple continued fraction expansion of $\text{SQRT}(a)$ in such a manner that the investigation can be extended to the orders of integers indicated above.

Verify that the period is bounded by:

$f(a) = a^{1/2} \log \log(a)$ if $a \equiv 1 \pmod{8}$ and by $f(a) = a^{1/2} \log \log(4a)$ otherwise.

● Something different

In March 1986, readers were invited to find integer solutions p, q, r, s, t for

$$5(p^2 + q^2 + r^2 + s^2 + t^2)^2 = 90pqrst + 7(p^4 + q^4 + r^4 + s^4 + t^4).$$

An extensive investigation by PCW reader, Duncan Moore, generalised the 90 to $5n$ and led to the following questions:

(a) Are there any solutions with three of p, q, r, s, t sharing one factor and the other two sharing a different factor? If not, then the search for solutions with three only sharing a common factor could be significantly speeded up.

(b) Are there any solutions with $n = 1$ or with $n = -1$?

Any investigations of the above problems, together with answers (either complete or partial) to Duncan Moore's questions, should be sent direct to: Mike Mudge, 22 Gors Fach, Pwll-Trap, Carmarthenshire SA33 4AQ (tel 01994 231121), to arrive by 1st December. The author also welcomes comments on the subject areas chosen this month: namely, continued fraction theory and Diophantine equations. Details of recent results either published or unpublished in these areas would be particularly appreciated.

Interesting Powers of Ten

Hugo Steinhaus' problem (PCW, January) was of great interest. This produced a very interesting set of responses. Worthy of mention in the Interesting Powers of Ten, are Paul Leyland's conclusion that there are no less than 1063017, other than those quoted — the result of almost three hours' computing time on a DEC Alpha. Nigel Hodges used Microsoft C++ on his Packard Bell up to 2^{10000} in three seconds and then established some associated probabilities. Steinhaus, being simple to comprehend, yielded a great deal of results. However, the clear prize-winner is Richard M Tobin, 2 Flr, 53 Spottiswoode Street, Edinburgh, EH9 1DQ, who programmed a Sun Sparcstation 5/110 in C and summarised all of the Steinhaus cycles up to and including twenty fifth powers! This latter took eight days and revealed nine perfect digital invariants (including 1), the next one having 24 digits.

PCW Contributions Welcome

Mike Mudge welcomes correspondence from readers on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future *Numbers Count* articles.



E-IDE add-ee-oh

Tread lightly through the seven steps to installing an Enhanced IDE hard disk: your PC's performance depends on it. Roger Gann is your guide.

In last month's column I showed you how to upgrade your PC to Enhanced IDE, which not only allows it to see the full capacity of today's enormous hard disks, but gives you other benefits, too, such as lightning-fast data transfer rates and a second IDE channel for other devices such as CD-ROM drives and tape streamers. This month I'll be completing the job by taking you step-by-step through the process of installing an Enhanced IDE hard disk and preparing it for use.

Fitting a bigger hard disk is perhaps the most popular upgrade that users undertake and it's not too difficult to see why. The arrival of Windows, and Windows 95 in particular, has led to an explosion in the amount of disk space occupied by a PC's operating system, its applications and data. Given plenty of RAM, many older PCs are more than capable of running the new disk-hungry 32-bit operating system, but their small, 170Mb hard disks just aren't big enough to hold the new operating system as well as all your apps.

The hard disk I used in the upgrade was the latest Quantum drive, the 2.5Gb Bigfoot. This is different to any other Enhanced IDE drive you can buy simply because of its form factor. Unlike its rivals, which fit a 3.5in drive bay, the Bigfoot harks back to a bygone age and fills a 5.25in bay.

It's one of the cheapest EIDE drives you can buy, but it's not the fastest. This is partly due to its slower, 3,600rpm spin speed and the diameter of its platters, which means its heads have more ground to cover, resulting in a so-so average access time of 15ms. However, the larger platter size does have some compensation: its tracks are

correspondingly longer and the heads thus don't have to move about quite so much. As a result, on small record transfers, its data transfer rate is up there with the market leaders.

Step by Step

Preliminaries

Take the time to prepare a bootable floppy and make sure it actually boots beforehand. Copy these DOS utilities on to it: FDISK, FORMAT, SYS and SCANDISK. Don't forget, we won't be

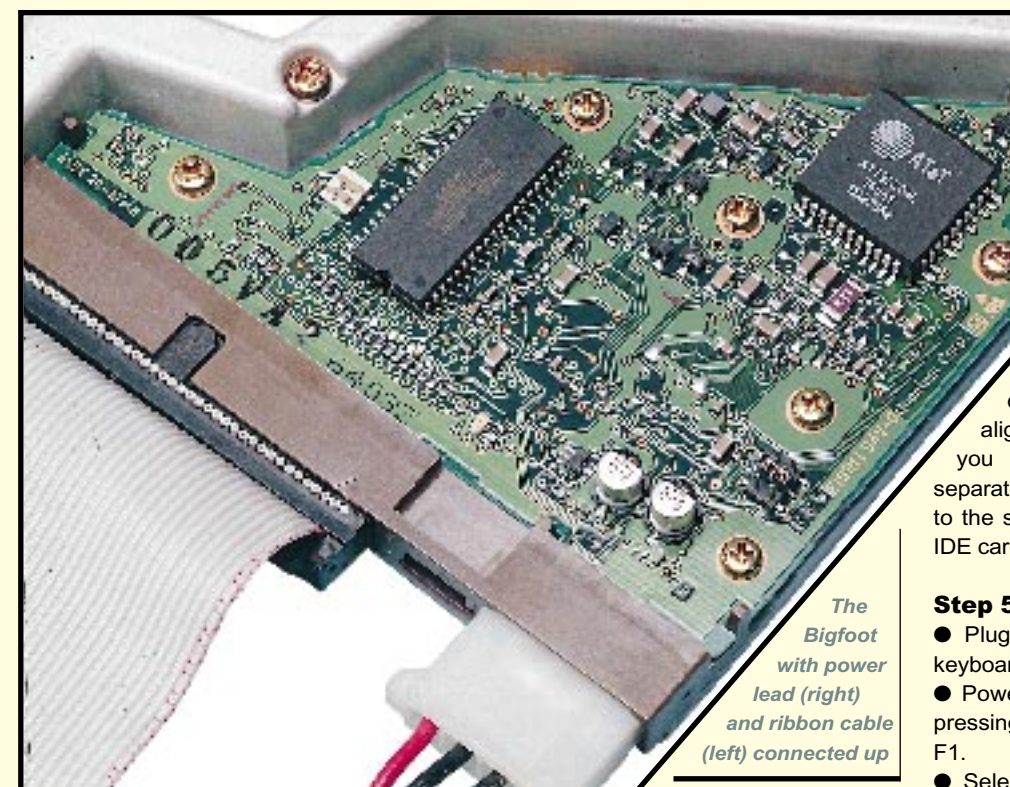
using the special driver software that often comes with large drives, as we'll be relying on our new EIDE interface card's on-board BIOS to support our new, large, hard disk directly.

Step 1

● Yes, I know it's boring and repetitious, but when you're dealing with electrical appliances you have to take safety precautions: so power down and unplug the PC from the mains, and disconnect all other leads, such as printers and mice. Before handling any electrical components, discharge any static electricity you might be carrying by



The Quantum Bigfoot is different to other EIDE drives as it will fill a 5.25in drive bay



The Bigfoot with power lead (right) and ribbon cable (left) connected up

the drive. Most modern ribbon cables are polarised to prevent you from inserting them the wrong way round, but others aren't, so look for a red or coloured stripe on the ribbon cable. This indicates Pin 1. Look at the socket on the drive (and on the interface card) for the Pin 1 label to correctly orientate the plug.

● Plug the other end of the ribbon into the primary E-IDE channel interface, making sure to align the coloured edge with Pin 1. If you have an IDE CD-ROM, use a separate 40-way ribbon cable to connect it to the secondary IDE channel on the E-IDE card.

Step 5

● Plug in the mains leads, video and keyboard cables, and power up the PC.
● Power up and enter CMOS setup by pressing the appropriate key, e.g. DEL or F1.

● Select the hard-disk option from the CMOS setup menu. Many modern BIOSes now offer auto-detection; they'll interrogate the drive's firmware to find out its values. Choose this option, if available, otherwise select Drive Type 47 or User defined. This allows you to plug in the drive geometry values manually; these will be detailed in the documentation and, most probably, on the drive itself. You'll be asked for the number of cylinders, heads and sectors per track, plus exotica like Write Pre-compensation and Landing Zone.

● Save the changes and quit Setup. Reassemble the PC, put the lid back on, do up the screws, plug all the cables back in and power up the PC.

Step 6

● We now have to partition the hard disk. This is done using FDISK, so boot from your previously prepared bootable floppy and load FDISK.

● Select 1 (Create DOS Partition) and 1 again (Create Primary DOS partition). Choose to make the entire drive one partition if that is what you want (but see overleaf).

● Quit FDISK and

earthing yourself: touch a metal pipe, for instance, or the PC's chassis; if you have an anti-static wrist strap, put it on.

● Undo the four or five screws and take the lid off of the PC.

Step 2

● Check out the drive fixings and where it's going to fit in the PC. You'll need a free drive bay for the new drive. The Bigfoot doesn't need any special mounting hardware but its 5.25in size means you'll have to put it in an externally accessible 5.25in drive bay, rather than a 3.5in internal bay, which is a minor niggle.

● Try and place it close to the EIDE interface as IDE ribbon cables tend to be short. Note that due to the very high data transfer rates made possible by E-IDE, you have to be careful about the ribbon cable used; for example, you mustn't use one longer than 18ins. Make sure you have the right mounting hardware, too, things like bolts or rails.

● Offer the drive up to the drive bay and make sure it doesn't foul anything else. Many modern drives list the geometry details on the label, so make a note of this before installation. If this drive replaces an older drive, remove it.

Step 3

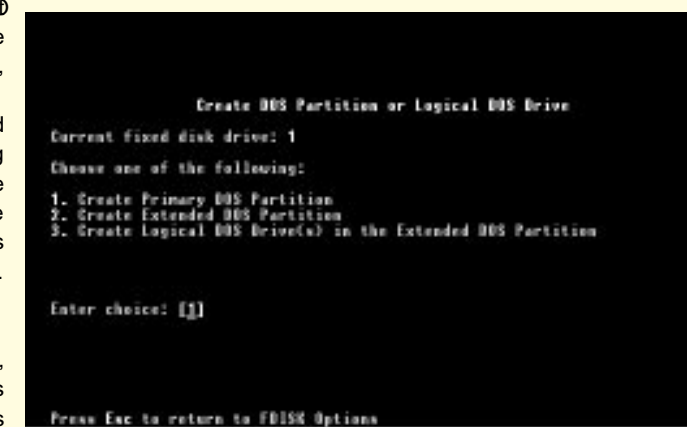
● As we're fitting a single drive, there's no need to move any jumpers on the drive and it should work in its

default configuration. However, if you're adding it as a second drive, one drive will have to be nominated as a master and the other as a slave. This will entail some jumper-shuffling on both drives, so have their respective user guides handy. Luckily, most modern drives now feature explanatory labels which describe the jumper settings and drive geometry, and this is true of the Bigfoot. At a pinch, if you can spare the second IDE channel, you can always leave the original drive as a master and simply plug it in to the secondary IDE channel.

Step 4

● Slide the drive into a vacant 5.25in bay and tighten up the mounting bolts. Insert a spare power lead (which can only be fitted one way).

● Now fit the 40-way data ribbon cable to



FDISK presents you with a list of simple menu options

Hard disk health and efficiency

If you read the section, *The importance of partitioning* (opposite), it's easy to see how storage efficiency, the ratio of wasted space (or overhang) to usable disk space, drops dramatically as cluster size increases.

Luckily, there is a very simple solution to this problem, and that is to partition the drive into smaller volumes, thus reducing the cluster size and raising storage efficiency in the process. This is easier said than done, however: repartitioning can normally be done on the fly and the process will zap all the data on your hard disk, so you'll have to back it up first and restore it later. This is doubly irritating for purchasers of new PCs (which are typically supplied unpartitioned) who might want to repartition right away: these PCs often come with lots of pre-installed software as well, such as Office Suite bundled software, which is sometimes supplied without master floppies. Another twist of the knife.

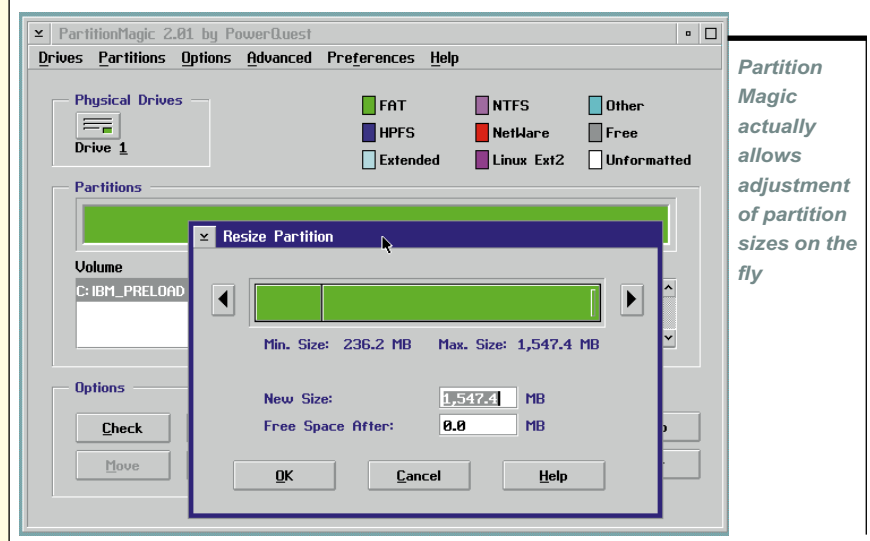
Partitioning is carried out using the old DOS utility, FDISK. Simply delete the original single partition and create a Primary DOS Partition just under one of the size thresholds listed here (i.e. 255Mb or 511Mb, rather than 256Mb or 512Mb). Next, create an Extended Partition occupying the rest of the drive, and from this carve out logical drives of 255Mb or 511Mb size. You then have to reboot and format each partition to make it usable.

So far, I've only come across one PC manufacturer, Gateway, that partitions new PCs hard disks. The P5-200 comes with a 2.5Gb hard disk and the one I looked at was

split into a 500Mb primary partition, containing all the program files, and a 2Gb extended partition. This was completely empty and so would be very easy to carve up with FDISK.

There are a number of alternatives to this painful route. Curiously, disk compression software such as DriveSpace and Stacker alleviates the overhang problem because it allocates file space on a per-sector basis. Stacker 4.0 is particularly efficient in this regard, as it allocates file space on a per-byte basis and so overhang is eliminated. It might seem daft to want to compress a huge disk merely to get over a DOS limitation, but there is a way around this. If you've got the Windows 95 Plus! Pack, it's possible to run DriveSpace 3 on a no compression setting on a drive partition up to 2Gb in size. This will give you high storage efficiency and minimal speed losses from running a disk compression utility.

Or, you can use PartitionMagic 2.0, which does allow you to adjust partition sizes on the fly. The latest version covers DOS and Windows 95 as well as OS/2. Written by US software developer, PowerQuest, it's available here in the UK from POW! Distribution (see PCW Contacts). Not only does PartitionMagic allow you to grow and shrink partitions at will, simply by grabbing an on-screen slider, it also overcomes the problem of file overhang and will dynamically resize disk clusters to smaller, more efficient sizes. It also increases the number of root directory entries to 1,024, which is useful under Windows 95 where long file names can



Partition Magic actually allows adjustment of partition sizes on the fly

the PC will reboot.

Step 7

● We now have to high-level format it, using FORMAT: boot from your system floppy and use FORMAT C: /S to format

the drive and transfer the system files to it.

Once this has been done, remove the floppy and reboot the PC to ensure it actually boots from the hard disk. And that's it. Your new hard disk is ready and you can start installing software on it.

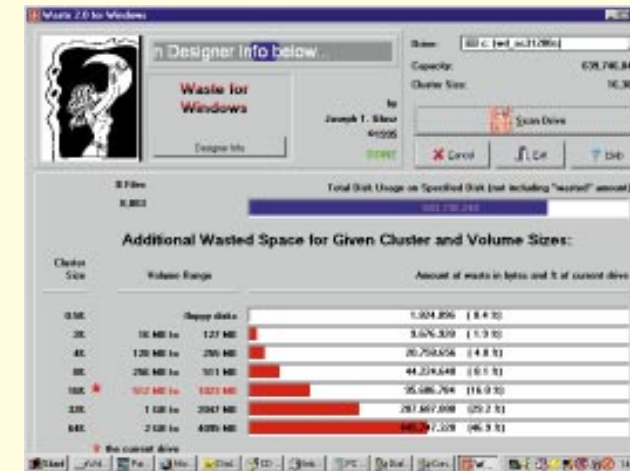
The importance of partitioning

But, that's not quite what you see, we've partitioned our new hard disk in a particularly daft way; as a single volume. While this undoubtedly makes for a simple life (after all, you only have to deal with just one drive letter), because the disk is so large, it also makes for very inefficient use of its space.

I illustrate this with an old chestnut I always trot out: a friend ran out of space on a 500Mb drive so he bought a new 1.1Gb drive, partitioned it as a single volume, and copied the contents of the 500Mb drive over to the new one. On this new drive, the data took up not 500Mb, as you might expect, but closer to 700Mb. *Shurely shome mishtake?*

The cause of this chronic loss of space can be traced back to the origins of MSDOS and Microsoft's decision to use a File Allocation Table or FAT file system. Originally, each entry in the FAT referred to a single 512-byte sector on the hard disk. Unfortunately, the FAT isn't open-ended and has a fixed maximum of 65,536 entries. This one-to-one FAT entry to disk sector mapping was okay for disks up to 65,536 x 512 bytes or 32Mb in size. In fact, up until MSDOS 4.0, 32Mb was the maximum size of hard disk supported by DOS. But how does DOS cope with disks bigger than 32Mb?

Simple: it breaks the one-to-one FAT entry to disk sector relationship by making each FAT entry represent more than one disk sector. So, for drives up to 128Mb in



size, each FAT entry represents a 2Kb cluster of four 512-byte sectors. And from there on up, as disk size doubles, so does cluster size: up to 256Mb it's 4Kb/eight sectors; up to 512Mb it's 8Kb/16 sectors, and so on.

Drive Capacity	No. of sectors	Cluster size
<128Mb	4	2Kb
128Mb to 255Mb	8	4Kb
256Mb to 511Mb	16	8Kb
512Mb to 1Gb	32	16Kb
>1Gb	64	32Kb

Note that both Windows NT 3.51 and OS/2 Warp use superior file systems (NTFS and HPFS) and so aren't afflicted with this problem.

Here's how this arrangement becomes inefficient: under the FAT file system, disk space is allocated to files in

This month's cover CD has a selection of hard-disk utilities including Waste for Windows, which analyses your hard disk for wasted space

whole clusters, and a file can occupy less than a cluster. So, if you have a 4Kb cluster, a 1Kb file will consume one cluster and the remaining 3Kb of disk space in that cluster is unusable, which is tragic but acceptable.

But if you have a large hard disk, with, say, 32Kb clusters, this overhang of wasted space rockets to a massive 31Kb, which is very bad news indeed.

A 1Kb file is an extreme example, but on average, every file will waste half a cluster. So if you've got a 1.2Gb hard disk, this means that every file will be wasting 16Kb of disk space. When my aforementioned friend moved his data from a 500Mb drive to a 1.1Gb drive, he crossed two jumps in cluster size, from 8Kb to 32Kb, and in so doing lost 200Mb of disk space; about 20 percent

PCW Contacts

Roger Gann can be contacted either by post c/o PCW or via email at rgann@mcgilivray.win-uk.net
 PartitionMagic 2.0 costs £69.95 (plus VAT and P&P) from POW! Distribution
 01202 716726



It'll be all white on the night... won't it?

Benjamin Woolley sets his tracing skills to work on the White Tower at the Tower of London. And the Intergraph made an impression — on his table.

Here's a story about how to turn real buildings into 3D models, with nothing more than an obsolete scanner and a nifty graphics utility.

A colleague asked me to compile a short animation featuring the Tower of London. All he gave me to work with was a series of old CAD models of the Tower, and a couple of days to do it in. The CAD files were huge and used the AutoCAD DXF format.

It is technically quite difficult to convert to a 3D animation package file format, including Autodesk's PRJ/3DS format. I did manage to convert some of the files, but the level of detail was so high, as it tends to be in CAD models, that it would have taken days, possibly weeks, to identify each object, label it and texture it. Given the urgency of the job, I decided on a quicker and dirtier tack.

My starting point was a ground plan of the central White Tower in a book about the Tower of London's history. I scanned the plan using my trusty Logitech hand



(3) The result of lofting the traced image, with a stone material mapped on to its surface

Fig 1. It doesn't look exciting, but it was just what I needed for the next stage, namely tracing.

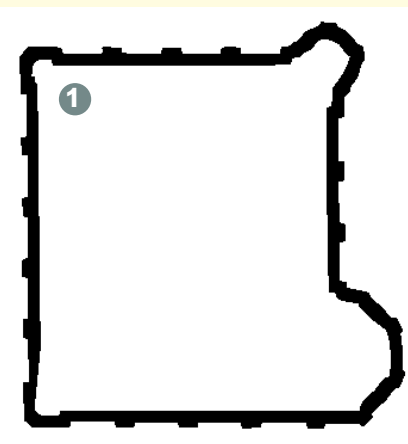
Tracing turns the flat bitmap image into a vector graphic, which is a drawing made up of lines and vertices, as shown in Fig 2. The software I used was the

OCR-Trace component of CorelDraw 6. Having gone off Corel following my experiences with CorelDraw 4, which was prone to crashing at vital moments, I feel the company has redeemed itself with version 6. Not least because of the improved quality of all the ancillary software, OCR-Trace included. It did an excellent job.

I exported the vector graphic as a DXF file, which I could import into 3D Studio as a shape. I tidied up the geometry, and then "lofted" it into a 3D object (Fig 3). This provided the basis of the finished model (Fig 4). There's a lot wrong with it, not least the texture of the walls, which is the wrong colour. The building is not called the White Tower for nothing. At least I know the general shape of the architecture is accurate.

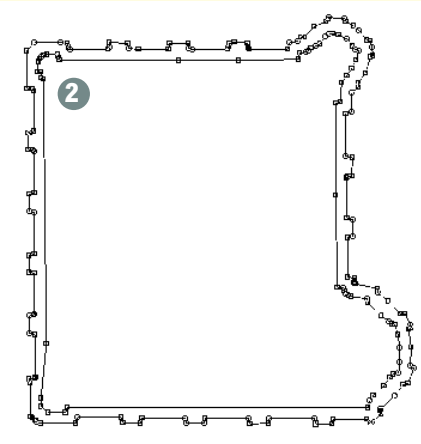
This scanning/tracing technique has a number of applications. I could photograph an object from a number of angles using a conventional camera, develop the picture on to Photo CD and use a bitmap editor to emphasise the edges. Most bitmap editors, such as Photoshop and Corel PhotoPaint, have this facility. Submitting the result to the

scanner, setting the colour depth to black-and-white to ensure maximum contrast between the outline and the background. I touched up the result using Photoshop, to cut out extraneous detail and scanning noise. You can see the finished image in



(1) The scanned image of the White Tower's floor plan

(2) The traced image. The little squares mark the position of the vertices



(4) A render of the final model of the White Tower. A faithful rendition of the original, except that it is not white

tracing program would generate a series of profiles that could be used to build a 3D model of the original. It would be a lot of work, but cheaper than using a 3D scanner.

Balance of power

Like great empires, great operating systems rise and fall. Unix, some predict, is about to be toppled from its pre-eminent position as the world's industrial-strength workstation operating system. And Windows NT, we are told, will be its replacement. Unix users will scoff at such a suggestion. NT, they say, cannot cope with more than a handful of processors, and does not enjoy Unix's track record for running "mission critical" installations.

All of this may be true, but the balance of power between the two has never been more finely poised. The reason is the emergence of a number of pumped-up PCs offering workstation-class performance for a relatively modest price. I have been trying the Intergraph TDZ-300, and the combination is awesome.

Let's not pretend that the Intergraph is an ordinary desktop system. The model I was using featured a 200MHz Pentium Pro processor, 64Mb of RAM, 12Mb of VRAM on a card boasting Intergraph's own OpenGL 3D graphics acceleration, a monster 21in screen which nearly made my table collapse, and a 2Gb hard disk. That lot retails at about £14,000.

Starting up the Intergraph was a strange sensation. The bootup sequence featured the same series of BIOS messages you would find on the most humble PC. Even with Word or Excel running under Windows NT, it felt like using a MiG for a package flight to Spain. Only with Photoshop, Painter 4 and 3D Studio Max

loaded did the full power of the hardware begin to manifest itself. My response was excitement tinged with disappointment.

The excitement comes from seeing what a Pentium Pro in a fast system can do. You do not need fancy benchmarks to observe the performance boost when you are doing 3D work. It is as though, until this moment, you have been working in a mud bath, with every movement and manipulation a laborious effort. With the Pro, reactions are instant. A rendered preview changes in real time, booleans happen in the blink of an eye, and models of complex architecture can be moved around the screen as though on a cushion of compressed air.

The disappointment comes with the discovery that, even with a 200MHz Pentium Pro under the bonnet and all that RAM and VRAM, the system has limits which are quickly reached. A polygon count running into the tens of thousands plunges you back in the mud.

This is to be expected. All workstations have their limits, even ones running Unix. The Intergraph, or even a top-of-the-range Dell or Compaq, in combination with NT, shows that those limits are no longer beyond the reach of the PC.

Max attack

The Intergraph gave me the opportunity to get my teeth into Autodesk's all-new 3D Studio Max, and I relished it. This month I want to dwell on one or two of Max's problems, not because it is bad, but because it is good. It is a package that pro and semi-pro 3D artists have to assess if they want to keep up with the state of their art.

The problems mostly concern the interface. Firstly, it is completely different from

that of 3D Studio Release 4 (3DSR4). The learning curve required to move from 3DSR4 to Max is no gentler than the one you must climb to move to LightWave, which currently costs £2,000 less than Max. This is important to remember when working out which upgrade route to take.

The second problem with the interface concerns its aesthetics. Autodesk, or Kinetix, the company's new brand name for its 3D products, is proud of the look of Max, claiming it is all the things GUI interfaces are supposed to be: intuitive, simple and elegant. Compared to 3DSR4, it is all of these, but by the standards of modern Windows and Macintosh applications, it's a mess. There is simply too much of it exposed to the user at any one time.

Furthermore, it raises expectations of a level of interactivity that is not quite delivered. You cannot change the geometry of an object directly, except when you create it. You have to do so via a parameters panel, although changes are updated interactively, which almost substitutes.

Another problem is part of one of the product's greatest strengths: its modularity. To get the most out of Max, you will need plug-ins. Some come as standard. There are particle and "bones" systems which can be used to create falling snow or skeletons. Most users will need to buy non-standard plug-ins, and the cost will not be trivial. Character Studio, the Autodesk character animation plug-in, is priced at £600.

Modularity also means that compatibility could become an issue. A model that relies on non-standard plug-ins for its geometry or materials will only work on a Max system that has those plug-ins installed.

Such problems need to be set against the fact that Max is excellent. It's sophisticated and richly specified. Even after weeks with it, I am only beginning to scratch the surface. It makes good use of NT's multiprocessing capabilities, now boasts a truly exceptional, if quite complicated, modeller and materials editor, and has a renderer that makes a clever compromise between quality and time. It offers intriguing features like the ability to render over TCP/IP networks, which means, in theory, you could have render farms spread across the Internet. You also have good documentation, and the reassurance of knowing that you are a member of a user base that is likely to prove as extensive and supportive as 3DSR4's.

PCW Details

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Optical illusions

Flatbeds, handhelds, document... They're all types of scanner. As an extra dimension to this month's group test, Gordon Laing puts you in the picture.

First things first. Last month's *Graphics and DTP* suffered a last-minute change, with the unfortunate result of an incorrect caption for the font-smoothing examples. It also doesn't take a genius to spot that our reproduction house failed to properly convert any of the screenshot TIFFs into CMYK, resulting in a load of black-and-white pics. Oh well, the joys of layout and reproduction.

For those interested in font smoothing, the caption should have read as follows.

"From the top working down: 8 point TrueType Times, 8 point Type-1 Times, 18 point TrueType Times, and 18 point Type-1 Times, all enlarged to indicate the differences. As explained last month, Windows 95 Plus Pack offers on-screen anti-aliasing smoothing of TrueType fonts, which makes the ATM rendered Type-1 fonts look particularly jagged."

Thanks to everybody who has written to me about the typography pieces that have appeared in these pages over the past few months. There's lots more in the pipeline. However, a complementary piece to this month's scanner group test occupies our attention here.

Scanners: the basics

Starting on page 126, we've tested and reviewed 18 devices: four handhelds, six flatbeds and eight document scanners. What type of scanner should you buy? Many people head straight for the flatbeds when they might be far better off with a document scanner. Then there's the minefield of resolution and colour bit depth, where in theory bigger is better. But do you need it, and what exactly can you use it for anyway?

As with all purchasing decisions, you must first decide exactly what you want to do with the scanner, what standard of per-

formance you are expecting from it, and how much you are prepared to spend.

It's best to start by deciding what kind of images you wish to scan. An increasingly popular scanning application is optical character recognition (OCR): the computer tries to convert a scanned page of words into an electronic text document; it is effectively reading the words. OCR, explained in greater detail within the group test, is not an infallible process. Even the most sophisticated OCR packages will make mistakes, particularly with badly-printed originals, and you will always have to proof-read the resulting document. Even so, the main body of the text will be present, making OCR a huge time-saver for those who do a lot of retyping.

OCR does not require a colour scanner, although many OCR packages can make use of greyscale information to better recognise character shapes. It's often handy to have some sort of automatic sheet feeder, letting you leave the device to scan several pages of text at once. If your original is not in sheet form, like a book or a magazine, you can photocopy the page and feed that through instead.

If OCR is going to be your primary scanning application, you should consider a document scanner. This breed of scanner is becoming the most popular thanks to their ease of use, low price and small size. Most are about the same size as a roll of kitchen paper, and feature built-in sheet-feeders which drag the pages through like a fax machine. They're cheap, too, costing between £99 and £250.

The software packages vary, but the best combinations of device and drivers fire up automatically as soon as a sheet is fed into the machine. All boast OCR and some kind of document management software. You can use a document scanner as a fax machine, but you'll need a fax modem, which will offer suitable software.

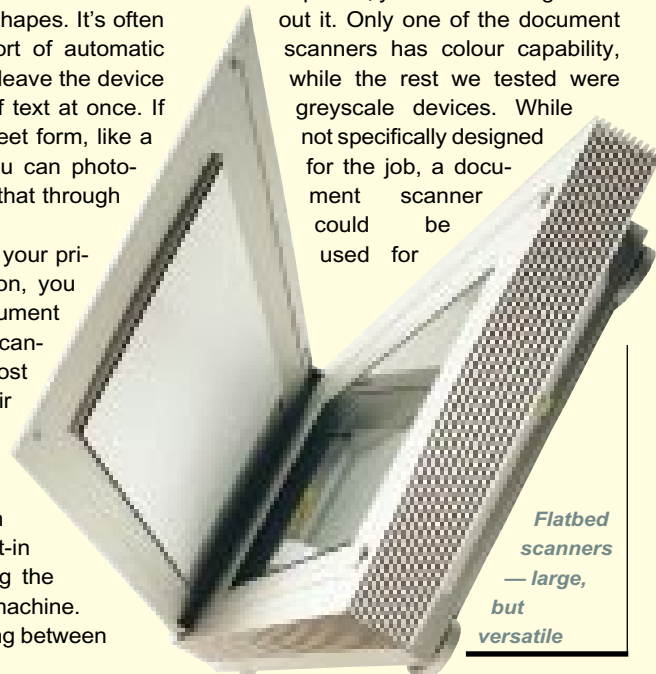
A flatbed scanner is perfectly capable of doing OCR, but if you want it to sift through a wad of sheets, you'll need to buy an additional automatic document feeder (ADF). These are expensive and not available for all models. A flatbed does have the advantage of being able to scan thick originals, such as books, magazines and even solid objects laid carefully on the glass plate.

A handheld scanner could be used for OCR, but is not recommended for any documents wider than the typical four-inch scanning width. This eliminates the vast majority of A4 documents. Handhelds often feature software which can stitch multiple scans together to make one big image, but this is not recommended for OCR.

Dealing with photographs

The other big scanning application is getting photographic images into your computer. Once scanned, a photo can be manipulated to improve the quality and remove or add desired elements. Afterwards it can be printed again, placed in a DTP document, or viewed on-screen on, say, a web site or CD-ROM title. Where the image ends up is the most important factor in choosing a suitable scanner.

In virtually all cases you'll want colour, although if you're only printing on a black-and-white printer, you could manage without it. Only one of the document scanners has colour capability, while the rest we tested were greyscale devices. While not specifically designed for the job, a document scanner could be used for



Flatbed scanners — large, but versatile



Handheld scanners — limited, but small and cheap

digitising printed photographic images, although most only offer low resolutions which could be limiting.

It's easy to get carried away with flat, reflective originals, such as printed photos and sheets of paper. Three-dimensional reflective originals, such as coins and keys, can be carefully placed on the surface of a flatbed, but flatbeds have a very limited depth of field and can only cope with objects small enough to fit on the plate. If you want to digitise a larger object and optionally keep the whole thing in focus, you'll need a digital camera.

Digital camera... action!

You may not have realised, but a digital camera carries a rectangular CCD imaging device which, when connected to a computer, produces the same kind of bitmapped files a plain scanner does. You could photograph your three-dimensional object, like a person, house or landscape, using a conventional camera and then scan the print using a conventional scanner.

What if your original isn't reflective at all, but transmissive like film transparencies? Scanning film is big business, but requires the light to be picked up after it has travelled *through* the original, rather

than reflected off it. Many flatbed scanners offer an optional transparency adaptor, which is little more than a new lid with a built-in light source. These cost about £500 and have one big disadvantage — they are still limited by the resolution of your CCD transport, typically between 300 and 600dpi.

300 dots per inch may be more than adequate when scanning a photo several inches across, but film originals tend to be much smaller. Take 35mm, which measures about 1in x 1.5in. Even a 600dpi scanner won't be able to offer enough resolution to reproduce a 35mm transparency, or reflective original for that matter, to much larger than double the size.

It's the dots that do it

It ultimately depends on how many dots per inch your output device requires, but as far as going into colour print is concerned, flatbed scanners with transparency adaptors are usually not good enough for 35mm film. In professional cases, they only become useful for 5in x 4in originals or higher. Exceptions include the very high-end Agfa DuoScan and Umax PowerLook 2000 flatbeds, both costing just short of £4,000 (plus VAT RRP).

You want small-format film scanned well? You'll need a dedicated film scanner, which concentrates all its dots into a tiny distance, where flatbeds in comparison lounge over eight or so inches. A film scanner may have the same number of elements on its CCD as a flatbed, but by limiting them exclusively to a very small area, their resolution could be over 2000dpi compared to the flatbed's 300.

If you only scan film, you may want to look into buying a proper film scanner; but the rest of us, who want occasional decent 35mm film scans without the investment, can turn to Kodak's Photo CD. The Photo

Font of the Month

Twang
 ABCDEFGHIJKLMNOPQRSTUVWXYZ
 abcdefghijklmnopqrstuvwxyzß+1234567890

Another display face from Fontek this month, available as a single weight for only £35 (plus VAT).



Document scanners — small, cheap and great for OCR

CD format is capable of storing up to 100 35mm images on a single recordable CD. Each image is stored in five resolutions, from a tiny thumbnail up to a whopping 18Mb file, certainly good enough for reproduction in a magazine after sharpening and colour correction. Most commercial photo labs with a two-week turnaround time charge less than a couple of pounds per image. Professional Photo CD labs can handle up to 5in x 4in film.

And so, to interpolation

Resolution plays a big part in scanning, and advertisers often try to confuse the issue by quoting the maximum interpolated resolutions of their scanners. Interpolation is the process of making up values in-between real ones to bump up the figures. It can work well for black-and-white line art originals, but is best experimented with rather than relied on. Check out our half-page in the group test where the same letter "g" was scanned at the highest claimed interpolated resolution of each flatbed, and see how some don't quite measure up. It's the horizontal optical resolution that counts, and for most CCD scanners (handheld, document or flatbed), that's between 300 and 600dpi.

It's safe to say that all of today's scanners boast optical resolutions capable of OCR work, but as identified in the earlier comments about scanning tiny originals like film, higher resolving powers can come in handy. As soon as you've discovered which scanning resolution is good enough for your output device, make a note of it. Remember that if you want to reproduce the original at twice the size in the same quality, you'll need to double the resolution. That's why 35mm film scanners may boast resolutions of several thousand dots per inch in order to produce images that can be reproduced to many times their original physical size.

Scanning for reproduction in glossy magazines requires extremely high resolu-

tions. The image setters used to print these magazines work at about 2400dpi. Outputting to a laser printer, even at 600dpi, is clearly much more forgiving. Take your monitor, which, depending on its size and the mode you're running in, will only be working at a resolution of between 70 and 100dpi. That's why you often have to zoom out several times in order to view entire scans with your limited number of on-screen dots.

The outlook is bright

Increasingly common applications for on-screen images are internet web pages or multimedia CD-ROM titles; viewing on-screen only requires quite modest or even low resolutions. One danger to be aware of is brightness and colour matching. Let's say your scan looks great on your monitor, which could be at a bright setting. When viewed on someone else's monitor, which could be much darker, the image will not look anywhere near as good. Check out how it looks on other systems before you pat yourself on the back on your fabulous homemade web page or CD title.

Before going any further, please note that you shouldn't necessarily scan at 600dpi if you've got a 600dpi printer. Most printers are incapable of printing shades, and can only either leave a dot or no dot at all. To simulate shades, they use a technique known as half-toning where different-sized dots are grouped to represent a shade when viewed from a distance. The bigger the dots or the closer together they are, the darker the perception. Similarly, the smaller or the further apart the dots are, the lighter the perception. Just look at a newspaper photograph closely to see how a greyscale image is printed with only solid black dots of varying size.

The upshot of this is that a printer usually has to place several dots to represent one shaded dot provided by the scanner. A 600dpi printer simulating 64 grey levels needs no higher than a 75dpi scan for same-size reproduction. Higher scanning resolutions need only be used for higher resolution printers, reproducing the original larger than real size, or for scanning black-and-white line art.

Bits and bobs

The last hurdle for now is bit-depth. Earlier scanners were either colour or not. Now there are different types of colour scanners, identified by the number of bits per dot or pixel. The first CCD colour scanners were described as having 24 bits. These are the same bits as used to describe your graphics-card display.

In a digital system you must have a finite number of colours or shades. How many

shades of grey should a digital system have between pure black and pure white in order for the human eye not to discern the steps? A figure convenient for computers was 256, which in binary is 8 bits or a single byte. Full colour can be made up of a combination of red, green and blue light. 8 bits per colour makes 24 bits in all for full-colour scanning. Or does it?

The best analogy is building a car to perform well at 70mph. Should its top speed be 70mph? No. We all know that in order to perform well at 70mph, your car should be capable of a much higher top speed. It's the same with scanners which suffer from undesirable noise, particularly in the least significant bits which represent the dark, shadowy areas of an image. In reality, a 24-bit scanner may be able to supply 20 good bits.

Then there's the problem of image manipulation. Every time you make an overall colour or brightness/contrast adjustment, you lose quality. Starting with more than 24 bits will ensure that after correction and noise clean-up, you'll still have a good 24 to work with. Enter the recent 30 and 36-bit scanners, capable of picking up all those tricky shadow and highlight details that were lost on inferior models. They are more expensive, but make a difference when scanning higher-density originals such as film, and/or for reproduction on high-quality output devices.

Drumming it in

Drum scanners are very expensive devices which use photo-multiplier tubes instead of CCDs, and offer a much higher tonal dynamic range than a typical CCD scanner. The tonal dynamic range relates precisely to the scanner's density rating, which for CCD flatbeds should be indicated by the number of bits. A true 36-bit CCD device should begin to approach the tonal dynamic range offered by a drum scanner. High-end flatbeds from manufacturers like Agfa and Umax claim to offer drum-quality output. One of these two flatbeds will leave little change from £4,000, while getting a bureau to do your work for you will set you back around £20 per drum scan.

● *I hope this column has helped you choose what kind of scanner you need. All you have to do now is turn to the group test to see which models we recommend.*

PCW Contacts

If you fancy a chat, write to me at the Broadwick Street address, or email me on gordon@pcw.ccmil.com

Agfa UK 0181 231 4200

Fontworks 0171 490 5390

IMC (for Umax) 01344 872800





Sounds good!

The sound of silence? No way: CD-ROMs are available with sound effects for every occasion. Panicos Georghiades and Gabriel Jacobs tune in.

We get mail from time to time asking about sound effects and media clip-art for use in multimedia applications.

Here's a typical message: "I'm looking for a collection of traditional sound effects like footsteps, doors opening, thunder and so on. Preferably, I want them in Macintosh format and royalty-free so that I can include them in Director movies. Do you have any idea where I could find such a product?"

Gordon Cowtan
(gordon@cowtan.demon.co.uk)

There are many CDs with sound effects in ordinary CD-audio format, but the best collection, in our view, comes from the BBC. The catalogue for internal BBC use spans over 100 CDs, and 40 of these are available at £29.99 each. There is also a cut-down, amateur collection of 12 CDs which cost £12.99 each. The Hollywood Edge catalogue from the USA is worth having, too. It's sold in the UK by a number of professional audio distributors, and there are about a dozen or more sound effects catalogues for use in music and film production.

For multimedia, there's less choice (of good quality material, anyway). You'll find far more in Windows (WAV) format than in Mac (AIF) format. More come from the USA than from the UK, which will make a difference if there's speech in the environments you're after. A typical media-clip CD-ROM is Moon Valley's



Global SFX is part of the Creative Essentials series and offers high-quality sound effects

News in brief...

- Asymetrix has just launched a special version of ToolBook for the Internet, called ToolBook II. It's said to deliver distributed learning applications in HTML and Java.
- Macromedia will shortly be releasing a toolkit for creating CD Plus using Director 5. Sounds interesting...
- Adobe Premiere 4.2 for Windows is now on sale, as are GLPro for Windows (the Windows version of the Grasp programming language), and Authorware 3.5.

ROM Material Again (£19.95). It contains video-clips, stills, animated icons and, of course, sounds. Most sounds are available in all the formats from 8-bit, 11kHz mono to 16-bit, 22kHz stereo. The sounds cover a selection of machinery, animals, nature environments and spoken words in American English, UK English and English with French accents.

This CD-ROM is targeted at end-users who want to use it to enrich their desktops

rather than for multimedia purposes. You'll find many similar CD-ROMs, and the sounds are really quite usable.

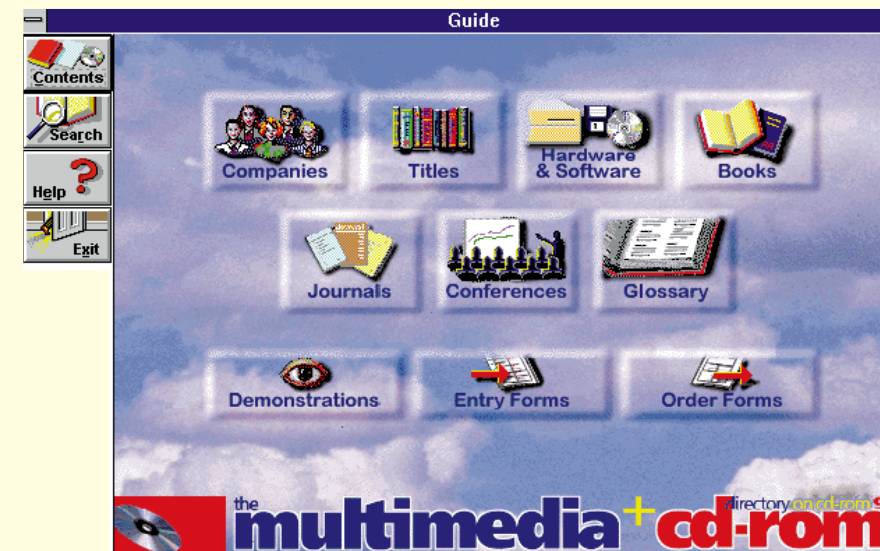
CD-ROMs specifically meant for multimedia are more rare, although they are beginning to appear in greater numbers. One example is a new CD-ROM release from the UK called Global SFX (£19.95) which has samples of a much higher quality than standard clip-art-type sound effects. In fact, it's the best you can hope for at the moment. It's part of a 30-volume series called Creative Essentials released by Time+Space.

The series has a dual use: multimedia, and sampling for music applications.

This is why most of the titles in the series have a musical instrument sound content. Volume 10, which we can recommend because of the quality of the recordings, contains sound effects. The sounds have been recorded in three formats: CD audio, Windows and Mac, and in 16-bit 44.1kHz stereo.

There are 26 tracks, with about 200 individual sounds. Here is a sample of the types of sound effects covered:

- Video and cassette machines, static, cameras, beeps, phone-related sounds, alarm, hammer, WC, typing, door-related sounds, stapler, spray-can, hair-dryer, kitchen sounds, lawn mowers, trimmers, water, percussion, zoo, café, swimming pool, market, public park, launderette,



The Multimedia and CD-ROM Directory is an up-to-date guide with worldwide coverage

sirens, airport sounds, railway station, various motoring sounds, ducks, flies, laughter, burping, footsteps, drinking, and a 1kHz tone for setting up your equipment.

One word of warning, however: with some of the CD/CD-ROM collections, you're free to use the sounds in your distributed applications. With others, you're only free to distribute the applications containing them, within your own organisation. In no case are you allowed to repackage and sell the sounds.

The Creative Essentials sound effects mentioned above are royalty free, so they're fine for you, but you must read the small print carefully.

The CD-ROM and Multimedia Directory

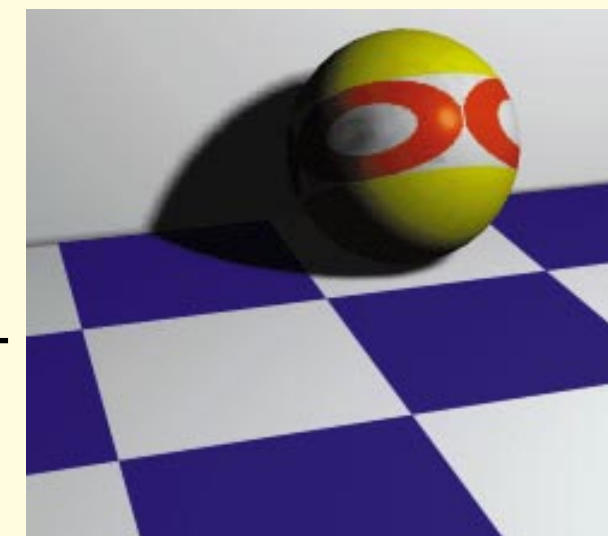
We've recently had the chance to browse through this year's Multimedia and CD-ROM Directory (on CD-ROM). It combines two paper publications: the CD-ROM Directory 96 (15th edition) and the Multimedia Yearbook (5th edition). It may be useful if you're looking for companies

that develop, or are otherwise involved in, multimedia and related hardware and software, even multimedia titles.

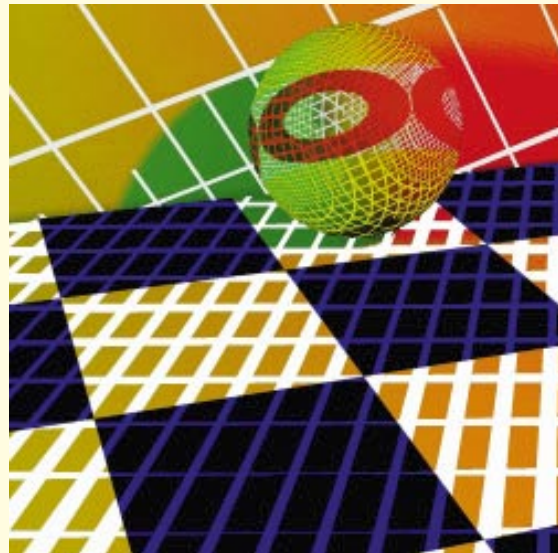
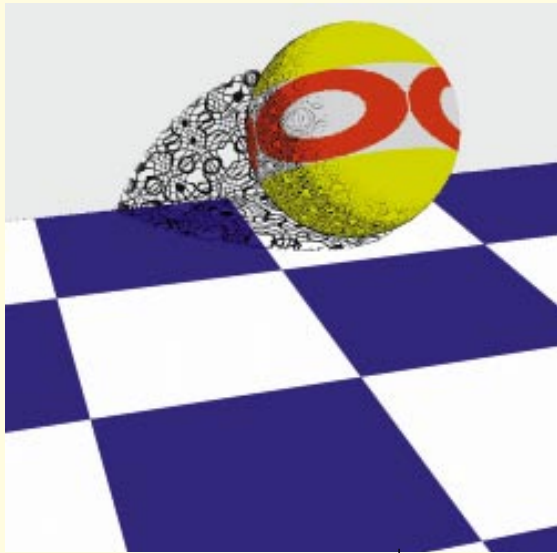
The publications have a worldwide coverage (there are about 1,400 multimedia-related companies in the UK alone) and they have a multi-lingual user interface for menus and help screens (English, French, German, Spanish and Italian).

The CD-ROM is divided into a number of sections including companies, titles, hardware/software, books, journals, conferences, and a glossary. There's a search engine, of course, and you can copy and print what you find.

The problem with material on CD-ROM today is that it can easily become dated, especially in an area as volatile as multimedia, even if the CD-ROM is updated every six months. We were pleasantly



An example of photorealistic rendering (more are shown, overleaf)



The two illustrations here show the kind of rendering that Artificial Drawing can perform. There are more examples on our cover-mounted CD-ROM this month

surprised to find included some recent versions of products, showing that it's about as up-to-date as possible. The importance of any directory of this kind is that it provides a good starting point, and this one certainly does.

● *The CD-ROM Directory 1996 (ISBN 0-333-662-55-5) and The Multimedia Yearbook 1996 (ISBN 0-333-662-56-3) cost £135 each. The CD-ROM version (which includes both) is a bargain at £175 and is published by TFPL.*

Artificially yours

Computer graphics have been around for a very long time. From their beginnings in the early sixties, with Ivan Sutherland at MIT, they have grown into a billion-dollar industry which has even arrived in Hollywood, as in the latest Disney blockbuster film, *Toy Story*.

Animations of the kind used in *Toy Story* are based on 3D models (wireframes) which are then rendered into photorealistic pictures by applying textures to surfaces, lighting and camera effects. These impressive animations are all produced in the same way. The computer always emulates a camera so it's difficult to create a personal style, and we all know how important this is in making an impact.

On the other hand, paint packages like Fractal Design's *Painter*, which emulate natural media, enable you to create works which are both expressive and creative. Recently, these packages have been able to import video clips and animations to which artistic effects can be applied. But these are applied to a 2D image.

The computer has no knowledge of the content in the picture. People, trees, and houses are all just screens full of pixels. So, although you can create artistic effects, it's difficult to make them realistic. For exam-

ple, the texture on a plane flying into the distance will not change gradually, so the flexibility that 3D animation offers is lost.

It would be nice to have the best of both worlds: a 3D animation system that also draws in the expressive styles allowed by 2D painting systems. A new technology called Artificial Drawing, developed by computer scientist Peter Hall, does exactly that. It allows animators to render animation frames from 3D models in a variety of expressive styles.

Artificial Drawing works by painting lines, dots, and other marks on the surfaces of 3D models in a scene. It paints more of these marks where a model looks dark and fewer marks where it looks light. When the scene is rendered, the marks made by Artificial Drawing are rendered, too. All the shadows in the picture now show up as marks, and this gives the picture its "painterly" feel.

Making a scene

To understand the difference between photorealistic rendering, painting systems, and Artificial Drawing, think of a sculptor who makes models, arranges them into a scene and then lights that scene. If the sculptor takes a photograph of the scene, that's like photorealistic rendering. If the sculptor paints over the photograph, that's like passing an animation/video through a painting program and adding effects. But if the sculptor paints the models and then takes a photo, that's like Artificial Drawing.

In this technique, the marks are more than just dots or lines: they're intelligent

textures, which is why they change depending on whether a model looks dark or light. Textures used in most rendering programs are applied to objects, but don't adapt themselves in this way.

The marks can be set up to look like ink, pastel, or paint to reflect photorealistic light, to create holes in models and to draw things like fur, and they can even move, to animate the sea.

A computer animator is able to choose Artificial Drawing marks from a preset library. New marks can also be created and stored. Different marks can be applied to different objects in a scene, and many marks can be applied to each model. Once each object has all its intelligent textures associated with it, the animation is then automatically created (even though the animator sees no operational difference).

For those in the know, Artificial Drawing is designed to fit into the standard rendering pipeline: it could be a part of any standard renderer, with no significant change to the rendering software.

If you're impressed with the stills and animations created using Artificial Drawing on this month's cover-mounted CD-ROM and you would like more technical information, contact Peter Hall (*see below*). ■

PCW Contacts

If you have any multimedia-related problems, queries, hints, tips, or suggestions, write to us c/o PCW at the usual address, or email:

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The value of logic

Down in the depths of Cubase lurks Logical Edit: Steven Helstrip unearths its creative possibilities.

Logical Edit is a powerful yet seldom-used editor found lurking in Cubase's drop-down menus. It is rarely used since it can be difficult to grasp, but once you have uncovered how it works, it can save you hours of ploughing through grid and piano-roll editors sifting out unwanted data.

It can also be used as a sophisticated "search and replace" tool, enabling you to convert, say, volume to panning information while deleting any other Continuous Controller information (see *Hands On Sound*, February '96).

Logical presets

When Cubase is first installed it sets up ten Logical edit routines that can be found in the Functions menu (see *Fig 1*). Such presets include Fix and Fade-Out Velocities. As with all editing in Cubase, only selected parts are affected.

To get a feel for what Logical Edit does, first record and quantise, say, a percussion track that includes many instruments. Next, select the part and apply each Logical preset one by one, listening to the effect it has. The presets mentioned above carry out simple, yet useful, functions. But there are some less obvious presets, like Push Forward and DelShrtNotes, that may need explaining.

DelShrtNotes deletes notes below a certain length that are likely to have been keyed in by mistake when playing a diffi-

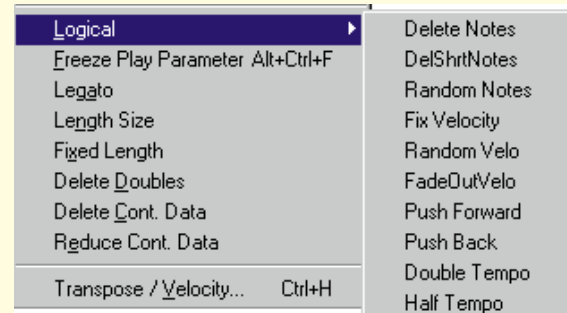


Fig 1 It's logical, Ed

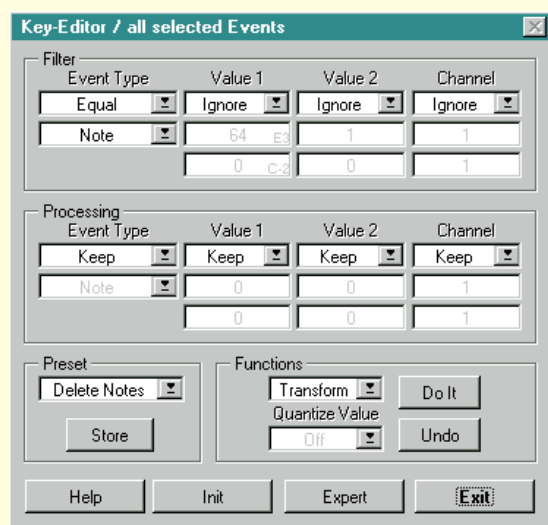


Fig 2 The Filter, Processing and Functions areas of the Logical Edit page

cult part. It's possible to change the criterion that specifies a "short note" (this will be covered later). Push Forward and Push Back behave similarly to track offset and permanently move data according to how it is set up. Half-tempo reduces the speed at which the selected part, or parts, are played back. It doesn't physically change the tempo at which Cubase is playing, or any parts other than those selected.

Editing presets

Before editing the presets it may be useful to understand how Logical Edit works.

Very simply, Logical Edit performs its tricks once filters and other criteria, such as ranges, have been set in the edit page. Filters "tell" the editor which data to work

with, and ranges specify values: for example, only process notes between E2 and E3. You can access the edit page from the edit menu or by pressing [Control]-[L].

Logical Edit operates in two modes; easy and expert. Most edits can be set up using the easy mode and this is what we'll examine now (expert mode and the more complex areas of easy mode will be tackled next month).

The Logical Edit page is split into three sections: Filter, Processing and Functions (see *Fig 2*). There is an additional dialogue box for naming and storing presets.

Filter

There are four columns in the Filter section that are used to select the events and ranges you wish to manipulate. The first column, Event Type, is fairly self-explanatory.

Events you can select include notes, CCs, poly pressure, aftertouch, program change and pitch bend. You cannot select velocity as an event since it is part of note information.

The first row, in column 1, enables you to set the basic condition for the filter and the second selects the event type. There are three conditions from which to choose: Ignore, Equal and Unequal. When Ignore is selected, all MIDI events will be affected by the filter. When the condition is set to Equal, only those events that are selected in the second row will be affected. If Unequal is selected, everything except the selected event will be affected.

When dealing with note events, the second column, Value 1, refers to MIDI note numbers (or pitch). If you are dealing with CCs, then Value 1 becomes CC number, etcetera. Like Event Type, Value 1 has conditions. These include Ignore, Equal, Unequal, Higher, Lower, Inside and Outside. Ignore means that all events (in this case, notes) will be affected. By setting the condition to higher, all notes higher than the value in row 2 will be affected.

Chord of the Month

This month's number is C7 with a flat ninth. It works nicely as an extended Dominant chord when playing in a jazz style in the key of F major.



Fig 3 (far left) Un-quantised percussion

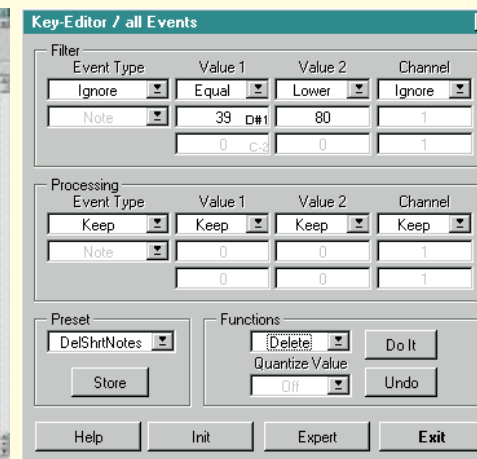


Fig 4 (left) Same track, different claps

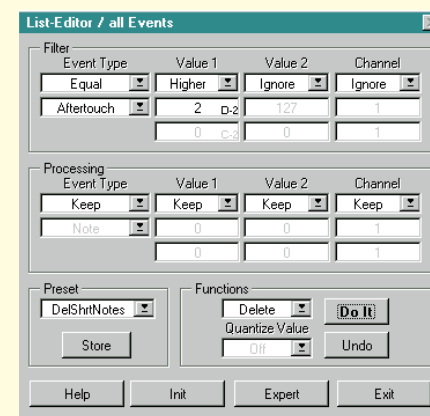


Fig 5 (below) Delete certain aftertouch events

There is a third row for columns two, three and four. These enable you to set conditions that affect events within a range. For example, setting the condition to "Inside" allows you to set two values. If these values were to be set to 64 and 127, only events that are between 64 and 127 will be affected.

The third column, Value 2, relates to velocity (or CC values when working with CCs) and has exactly the same conditions as Value 1. The fourth column, which is rarely used, applies to MIDI channels. Sometimes it is only necessary to use the filters section to achieve results that would normally take forever using the list editor (see *Figs 3, 4 & 5* for examples).

Fig 3 shows a typical unquantised percussion track with many instruments playing the same part. The following example shows how to quantise just one instrument, or sound, within that part to retain a natural, or "live" sound. The instrument, or sound, to be quantised is the kick drum, which is mapped to C1, or MIDI note num-

ber 36. Under Value 1 in the Filter section, enter the condition "Equals" and the figure 36. This tells the Logical Editor to deal with this note only. Then, you need to tell the editor what to do with it. In the Functions dialogue, select Quantise with a value of four. And finally, press "Do it".

Fig 4 is based on the same percussion track. This example, though, is set up to delete all hand claps that have a velocity below 80. It involves setting up Value 2 to "Lower" than 80 and selecting delete in the Functions dialogue.

Fig 5 is set up to delete all aftertouch events greater than two.

Processing and Function

Once you have mastered the Filter section, the Processing dialogue becomes a very powerful and useful tool. It looks very similar to the Filter section, yet instead of setting Conditions you apply Operators. These define a process that Logical Edit should apply to the filtered events. Operators include Keep, Plus,

Minus, Multiply, Divide, Fix, Value 2, Dynamic and Random.

The best way to get acquainted with the Processing dialogue is to select preset Logical Edits to see how they are set up. For instance, if you look at Fade Out Velocity (*Fig 6*), you can see that the Filter is set up to deal with note events only. Value 2 (Velocity) in the Processing section is set to Dyn (Dynamics) and has a

D-Zone Solo AWE-32 Compilation and Wav

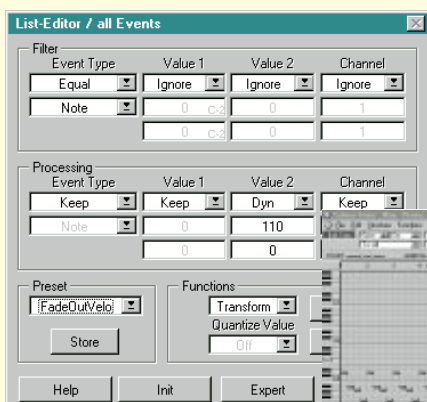
D-Zone's Loopisms for the AWE-32 compilation came into my possession several months back. With over 850 samples, it contains nearly half of D-Zone's entire sound library. The Solo compilation contains most of the rest of D-Zone's archive and is available as two separate CDs in either sbk or wav format.



You get more than 550 digitally recorded and edited samples ready for use in every conceivable style of dance-orientated music. The samples are compiled from the three volumes of WorkStation and Jungle Joose CDs. You also get working demos of Steinberg's entry-level sequencer, Cubasis, and Cool, a Windows wave editor. WorkStation 1 features samples from Roland's last attempt at making a decent analogue-style synth, the JD800, while WorkStations 2 and 3 are packed with "live" instruments from the E-MU Proteus range. Jungle Joose contains around 30 loops and, allegedly, the only bass sounds you will ever need — don't think so.

Samples are sensibly arranged within folders, which makes it easy to quickly find the right sounds and loops. There are also "low RAM" versions of the larger samples, enabling instruments to be loaded within the standard 512Kb on the AWE-32. This is a fantastic collection of dance sounds for an equally impressive price (see *PCW Contacts*).

● *D-Zone Solo AWE-32 Compilation is distributed by Time + Space.*



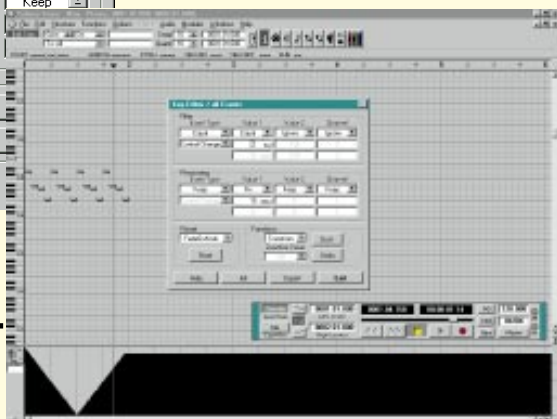
Transform has been selected within the Function dialogue. When "do it" is clicked, all volume CCs are converted, or transformed, to pan CCs. If "Insert" is selected within the Function dialogue, then volume CCs are copied to pan CCs.

Fig 6 (above) Create a fade
Fig 7 (right) Go ahead: "do it"

starting value of 110 and a final value of zero. Therefore, when the process is applied, a fade, or diminuendo, is created over the length of the selected part. To create a fade-in, or crescendo, simply exchange the two values. The values can be changed to begin and end at any level or velocity value you choose. To save the edit parameters, click "Store" while holding down the Alt key. You can then give it a name by double-clicking the preset that was replaced.

The next example (*Fig 7*) changes volume information (Continuous Controller no. 7) into panning messages (CC no. 10).

In the filter section, the Event Type has been set Equal to Control Change and Value 1 Equal to 7. This tells Logical Edit only to look for, or filter, Volume information. In the Processing department, Value 1 has been "fixed" to a value of ten and



Next month, we'll be delving deeper than deep into the depths of logical editing. Until then, have fun with these examples. If anyone has created any useful edit routines and would like to share them with other readers, please let me know. ■

PCW Contacts

Readers' contributions to the Sound column are music to our ears. If you have any hints or tips, any MIDI-related items or general comments, send them to the usual PCW address, or to steven_helstrip@pcw.cmail.compuserve.com

Time + Space (D-Zone Solo AWE-32 Compilation, £24.95) **01442 870681**





A break from the old routine

Tim Anderson makes a splash with Visual Basic, and studies a slimline alternative to the Microsoft or Borland database engines.

One of the keys to developing efficient, robust software, especially if you want to do so quickly, is to re-use code. Ways to do this include creating Delphi components, C++ classes, or using VBX or OCX controls in Visual Basic.

Dynamic Link Libraries (DLLs) are the foundation of Windows, and a great way to create functions that you can call from any programming language. You cannot create old-style DLLs with VB, but version 4.0 introduced OLE DLLs, allowing VB code to be called from other applications via OLE automation.

These are good ways to re-use code, but there is still a place for the oldest and crudest technique, which is cutting and pasting routines from one application to another. Programmers are lazy and will happily ransack old but working code to save time and avoid errors.

For example, a common requirement in VB database applications is to export a query as a .DBF table, the most universal format for mail merge, or transfer to other applications. JET's SQL supports a SELECT ... INTO clause that creates a new table from a query. If the database in question is an Access MDB, this only creates a new table in .MDB format. To get round this, I use this technique:

1. Output the query to a temporary table.
2. Copy the structure of the table to a new .DBF.
3. Copy the records in the temporary table to the .DBF.

This works well, and I have no intention of rewriting the code, which gets popped into applications as required. Only the second step takes more than a single SQL

command, so this is wrapped in a re-usable function declared like this:

```
Sub CopyStructureToDBF(MDBName As String, TableName As String, DBFPath As String, DBFName As String)
```

It is vital that no paths or field names are hard-coded into the routine as this would wreck its re-usability.

The DIY solution

Once you have built up a library of routines, the next question is where to store them. Simplest is to have a directory full of .BAS files, but this is awkward to manage. It can also lead to the inefficient and unsafe strategy of including many unused routines in your project, for the sake of one or two that happen to be in the same

module. A better solution is to write your own database application, storing each procedure in its own memo field.

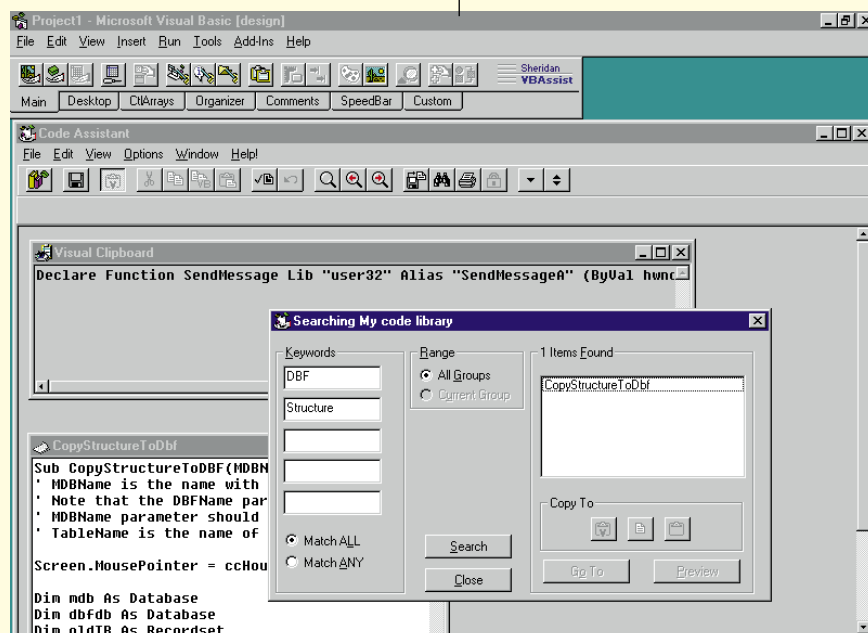
Alternatively, there are utilities that aim to make it easier to manage your code library. One is Sheridan's VB Assist, now at version 4.0a. VB Assist loads as an add-in, and includes Code Assistant. Code Assistant has two main elements. One is a visual clipboard, a text window to which clipboard output can be redirected. The other is a code database, called Code Librarian, which is actually a VB front-end to an MDB. You can create groups within which to store your routines, and add keywords for easy search and retrieval.

Code Librarian is a good idea, but it's not as well implemented as it should be. The way the database is structured suggests an outline tree for navigation, rather than the drop-down combos actually used. It is silly that keywords can be no more than ten characters long. You can edit code within the Assistant or Librarian, but it's not a good environment for coding, with no syntax highlighting or search-and-replace facility. But it's better than nothing.

CodeBank

Unlike Code Assistant, which is part of VB Assist, CodeBank is a separate product

Part of Sheridan's VB Assist, Code Assistant lets you create libraries of code, and copy routines either direct to your application or to an intermediate clipboard



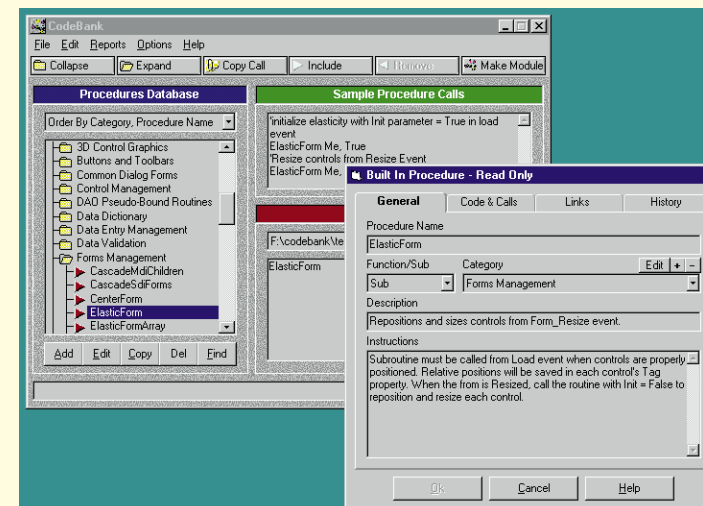
from Visual Components, best known for the Visual Developers Suite. Again it is a VB database application, but is a standalone program rather than an add-in. The idea is that all your re-usable routines are stored in the CodeBank database. When you want to make use of them, you ask CodeBank to create a new, empty .BAS module, and add the required routines. Finally, the generated module is added to your Visual Basic project in the normal way.

CodeBank has a tidy, effective interface. Procedures are shown in a tree, which can be sorted by category, author, name or type (procedure or function). Each routine can have substantial information stored with it, including short and long descriptions, an example of use, maintenance history, and links to any declarations or other routines that are required. CodeBank is intelligent about these links: if a particular procedure makes use of a user-defined Type, the generated Basic module will include the declaration as well as the procedure itself.

The bonus is that CodeBank includes a library of 160 routines, with the emphasis on economy and performance. Many of them use VB code to emulate what might normally be done with a VBX or OCX control: for example, the outline used by CodeBank is drawn entirely using VB code. Another example is a procedure which shows text next to a control by printing directly to the controls' container, avoiding the need for a conventional label control. These routines are impressive, letting you create sophisticated graphic effects without the performance and size penalty of adding lots of components. Anyone interested in efficient VB coding will enjoy them.

CodeBase 6.0

If the idea of distributing applications on a single floppy disk appeals to you, you will like CodeBase. Very small executables can be built in C, while VB or Delphi applications require a 500Kb runtime DLL, much smaller than either JET or the Borland Database Engine. Well-established in the xBase community, CodeBase is a C library for handling database

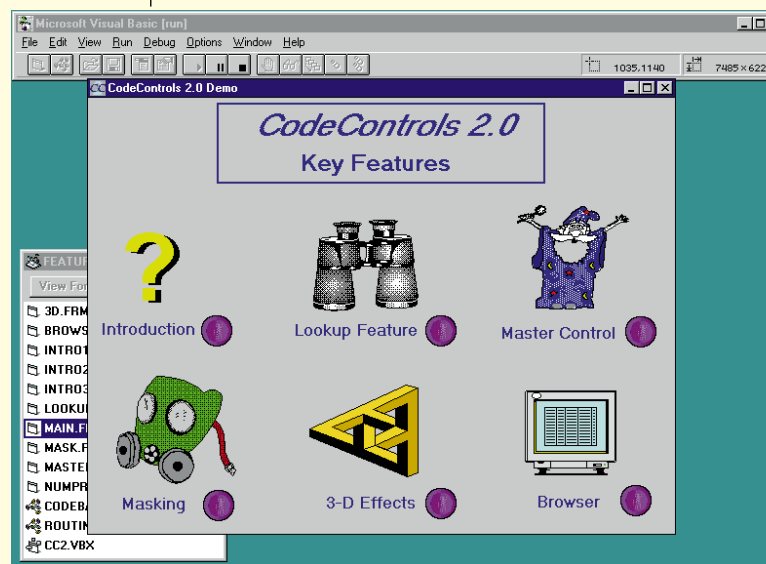


tables in .DBF format, which are either FoxPro, Clipper or dBase IV compatible. Sequiter now provides versions for C++, Visual Basic and Delphi. The new version bundles the lot onto a single CD-ROM, which is convenient if you use more than one of these languages.

Other significant changes in version 6.0 are limited 32-bit support, the addition of client-server support via a new CodeBase database service application, and new transaction processing functions that will be useful in both standalone and client-server applications.

There are rough edges in this product. Although a 32-bit DLL is supplied for Visual Basic, the data-aware CodeControls are VBX only. An error in one of the main VB examples prevents it from running. Delphi support is currently only 16-bit, although a

CodeBase can be integrated with your preferred visual tools, but not without some nitty-gritty coding



Codebank comes with a generous library of routines for slimline VB programming. No, there is not a tab control on this dialogue — it's all done with Basic

32-bit DLL is available on request. Pascal documentation is more complete than in previous releases, but examples are in the form of short routines rather than a full demonstration application.

No effort has been made to create Delphi units or components to simplify use of CodeBase, which is a missed opportunity, bearing in mind the large number of migrants from Clipper, dBase and FoxPro now using Delphi. Successware, with its xBase product called Apollo, has done more to appeal to the Delphi community.

It is worth persevering, for the sake of fast performance on modest hardware, as long as you are willing to get your hands dirty with mysterious functions like "relate4createslave" and "code4initundo." While it is fine for both single and multi-user databases, it is harder to see the benefits for client-server work, unless you have an existing CodeBase system to upgrade. It is competing with many other advanced SQL-based systems, as well as another Sequiter product, the ODBC-compatible CodeSQL.

Code Complete makes a splash

Seasoned VB developers will know the story. A bemused user calls and says, "I tried to run your application. A message came up saying, 'Wrong version of SOMESTUFF.VBX', and then it quit." Windows is highly vulnerable to this kind of problem, and increasing use of OLE, which has its own myriad support libraries, will only make things worse.

Microhelp has a solution in the form of the Splash Wizard. From its name, you would think this is just a way of creating

fancy welcome screens, but this is secondary. The Splash Wizard creates a new executable which does comprehensive version-checking before launching your application. That way, problems can be identified before your application tries to load. Another possibility is to check for a valid user name and serial number. You can configure things so that your application can only run after the splash executable gives the OK.

Splash Wizard is a good idea, but I was not convinced by its implementation. It is fiddly to use, particularly since the wizard only operates from scratch. If you want to amend an existing splash executable, you have to tweak its resource file by hand, or by using a resource editor. Finally, in a simple test run, I tried out the



Splash Wizard is an expert version checker, but can be slow

Splash Wizard by deliberately deleting a .DLL needed by a VB application. The

Wizard took a finger-tapping fifteen seconds to report the problem; the VB application on its own took two or three seconds.

Code Complete comes with three other components. The Assistants automate the creation of common dialogues, message boxes, and allocating help IDs to VB controls, this last one being the most useful. Code Analyst will analyse and cross-reference Visual Basic projects, commenting on unused code and identifying deviations from standards you specify. For example, you can check that all modules include Option Explicit, or that error handling is enabled in all procedures.

If you have problems, the fourth component, AutoCoder, may help you out. A template-based system, it can automatically edit your code by adding error handlers for example. Another useful trick is to add temporary timing functions so that you can profile the application, discovering which routines are slowing down your software and need tweaking.

And finally...

Keep honing those Visual Basic skills. Microsoft is licensing the next version of the VBA engine to third-parties, so expect to see it in new versions of applications including Photoshop, AutoCAD and Visio.

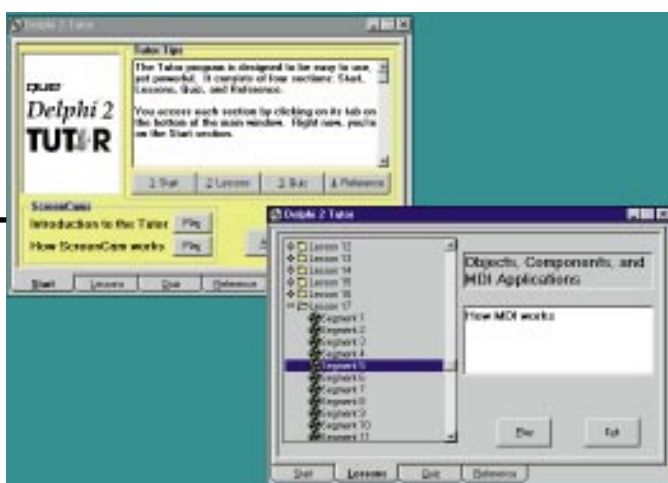
Visual Programming: read all about it

Delphi 2 Tutor, by Mike McKelvy

Ironically, the software which runs this Delphi tutor is written in Visual Basic 4.0, assisted by Lotus ScreenCam. It is the opposite to *Delphi Unleashed*. Introductory and shallow, the excuse is that it is for complete beginners. The special feature is that each lesson has several screen demonstrations with explanatory voiceovers; seeing something done is certainly a help, but in this case it is not well implemented. The interface for the tutorial application is poor, a shame in a teaching tool, and the reference section is skimpy and inadequate. While Mike McKelvy's accompanying book has clear explanations of basic programming concepts, there is not enough information here to build real applications of any substance. A better approach would be to take the reader step-by-step through creating an example project. Video demonstrations are counter-productive unless they encourage hands-on experience as well.

Delphi 2 Unleashed, by Charles Calvert

The first edition of *Delphi Unleashed* established itself as one of the best titles for serious Delphi developers. The author works for Borland and is well placed to uncover Delphi's inner workings. This is no cosmetic rewrite: the new edition has over 1,400 pages, and more than half of this bulky volume is completely new. For example, you get 50 pages on multithreading, 250 pages on databases, 150 pages on OLE, and 200 pages on multimedia development. It is an enormously useful resource, clearly written, with sound explanations of both Object Pascal and the Windows API. The sheer amount of material makes it an intimidating volume, both physically and otherwise. Some will be glad to know how to create windows without using Delphi's Visual Component Library; others will wonder why we need to be told. Overall, not for the faint-hearted or beginners, but still a great companion to Delphi's inadequate manuals and online help.



Delphi 2 Tutor includes plenty of video sequences, but neither the presentation nor the content is inspiring

PCW Details

Contemporary Software

07000 422224
(VB Assist 4.0a, £135; Code Complete, £175) **Visual Components**

01892 834343 (Codebank, £99)

Highlander Software 0181 316 5001
(CodeBase 6.0, £225)

Books

Books from **Computer Manuals**
0121 706 6000

Delphi 2 Unleashed (Sams). Book and CD, £54.95 (inc VAT)

Delphi 2 Tutor (Que). Book and CD £46.99 (inc VAT)



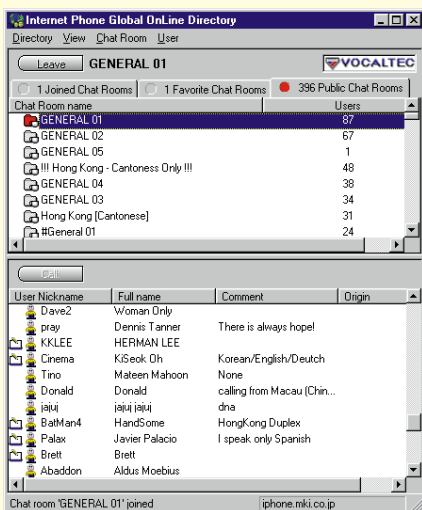
If you can't beat 'em...

Stephen Rodda has finally given in and fitted a sound card. There's fun with the Internet Phone, a fax pack and FAT 32, too.

This old fuddy-duddy has finally got a sound card. "Why," I hear you ask "is this in a networking column?" I don't know; apart from the fact that almost everybody's machine seems to be sporting one, and you can't really consider a high-range machine without one these days. So, multimedia has finally hit "Rodda Towers" and, after all, it is necessary for things such as internet and intranet telephony.

With plug and play, which was almost perfect under Windows 95, the card ran quite happily. Until, that is, the Energy Star power-save on my green motherboard cut in. Then the sound card's output had a severe attack of the vibratos. The only cure was to restart the machine and open the BIOS configuration to prevent the processor being clocked at a slower speed when not strictly in use. This cured the problem.

The review sample came from Creative



Internet Phone waiting for a call

parameters. It seems there are no drivers available for the plug and play card.

I was surprised by the fact that although clone cards come with AWE-32 MIDI-capability as they stand, the kosher SoundBlaster cards have this as an additional extra. I was not able to use any of the MIDI voices already installed on the clones.

Something which comes with the cards is a voice synthesiser. These voices sound like a cross between a dalek and the Beverly Hillbillies. One of them sounds like they've got a throat infection. Just for fun I got one of the voices to read the Dutch text which came with the sound card. The result was hysterically funny.

Labs and was a SoundBlaster 16 Plug and Play which came with its own IDE port for CDs. This makes three IDE ports, including two on the motherboard, which are installed in my machine, none of which I use.

Under NT 3.51 I had to use the ordinary SoundBlaster NT driver and tweak the

Internet Phone's directory of currently online users

Internet Phone phun

Wondering about the Internet Phone, I downloaded INETPhone 4.0, which has just been released, and tried it out.

This package allows the transfer of audio data over the Internet and lets you make a "telephone" call without the associated call charges. All you need is a sound card, an internet connection, a microphone, and a loudspeaker or a pair of headphones.

There are various methods of calling. ➔

You can either specify an address directly (if you have a schedule to call someone) or phone them and tell them to get onto the internet in, say, ten minutes' time. Or you can join chat rooms. This journalist discovered that people were merely lurking in these chat rooms for some nefarious purpose or other, and quickly left.

If we were to use this piece of technology wisely, it could save a fortune in phone calls over the company WAN. But be advised that the bandwidth is probably greater than a traditional telephone call. PTTs (Postal, Telephone and Telegraph) are trying to ban this as it could undermine their monopoly on voice transmission.

One other problem is that if everyone used the Internet Phone program, the internet or intranet could screech to a halt (at least until the backbones had all been upgraded again).

Internet Phone is well-presented, installs professionally and does what it claims. This new version allows you to leave voicemail for someone, which gets dropped into their mailbox. A whiteboard option is available which allows multiple users to leave comments, much like OS/2's groupware which I reviewed about a year ago.

It seems that people are on the internet just to make funny noises or for, er, other reasons. As the technology matures, or in the right hands, it will be a very useful tool.

Telcom Fax

On a more serious note, I've been looking at Telcom Fax, which has just come out in the new 3.0 version. This is specifically written for Windows NT and allows the modem to be shared as a fax machine.

I know I keep griping about this, but the manufacturers of fax-sharing packages should really get their heads together and

work out a method of including the poor relations like Macintosh, OS/2 and UNIX in the general scheme of things.

As things stand, there is no cross-platform fax package. Why not? Simply because nobody ever considers the advantages of real networked fax. Many networks are of mixed-platform machines, especially now that NT makes mixing Unix, OS/2 and Macintosh machines on the same LAN as their PC counterparts so easy.

Why can't we have a shared network fax package which caters for Macintosh and Unix machines? I'm sure it wouldn't take too much work to implement. NT Server even has a PostScript rasteriser and Adobe has fax extensions for PostScript, which are already in use on Data-products machines, available on the Macintosh and other platforms.

A program would have to fish out the details, presumably encoded into the PostScript output, send the code to the rasteriser and then transmit the resultant bitmap to the address and recipient which it read from the PostScript code. I've had the idea, so all someone needs to do now is to implement it. Remember, you read it here first!

I tried installing it on the net as <http://www.compulink.co.uk/~teddy/TF30/EVAL.EXE>. It seemed to get nowhere under NT 3.51, with or without service packs or the new-technology shell preview (Windows 95-alike). Don't say I didn't warn you. I have included a screenshot of it (*below*) just to whet your appetite.

FAT filing

FAT 32 is the new version of the MSDOS FAT filing system. It's just like the old MSDOS filing system, with long file names which we've been used to under NT and

Windows 95 but with one important difference: don't expect to read the partition under DOS 6.22 or under NT, because it isn't supported.

This FAT 32 filing system is installed on Windows 95 machines which have had Windows 32 installed on them at the factory, and it makes NT multibooting a very difficult procedure. The advantage is that it is capable of using far smaller cluster sizes, hitherto a problem under FAT.

With 2Mb drives, a cluster size of 32Kb was always used as there were only 16 bits used to address a FAT cluster. With FAT 32, we can use 4Kb clusters for DOS files. No doubt there will be NT drivers, but they are not yet available.

If you want to use a FAT 32 drive with

NT, it would be better to install an older version of DOS. Partition and format the partition under this version of the operating system. Install Windows 95 on this partition so that NT can read the FAT partition and consequently share the primary partition.

Putting the boot in...

● "I am working for a project to get diskless workstations to run from a Windows NT server 3.51. NT, believe it or not, provides a remote boot service which allows it to happen. (To my surprise, I recently discovered this in the installation guide.) But I am having trouble with the boot PROM chips on the network cards.

Apparently, there are specific boot

PROMs for NetWare, as well as for NT. I have not been able to find a provider for the NT versions. Can you help me?"

Ivan

ilabra@clink.samara.co.zw

That is a problem. I'm afraid I've never been able to find LAN Manager remote boot PROMs either.

The other thing to remember is that you have to use cards with MAC addresses within Microsoft's pre-planned scheme of things for each manufacturer. Otherwise it doesn't do a good job of recognising them, and therefore pukka Novell/Eagle cards are the best bet.

Unless you're running DOS on the diskless machines, it's wise to forget the

Two-way Winder

I've been reading Davey Winder's new book, *Sex and The Internet*. Firstly, let me get this out into the open: Davey's an acquaintance of mine, so I may be thought of as plugging the book. But I'm not.

The book is a well-written, humorous and authoritative guide (at the time of writing) to all the sites where things of a sexual nature within the bounds of reason, if not censorship, can be found.

This book can be thought of in two different ways: firstly, as a guide to where to find this type of material, and secondly, as a guide to where *not* to go so as *not* to discover this type of material.

Let me clarify what I mean. The first meaning is obvious, but the second perhaps not so. A network administrator may configure a firewall — a computer used to share and filter various bits and pieces out of a direct internet connection — in one of two ways. The firewall may only allow connections to and from trusted sites, say www.bigcompany.com, or the firewall may disallow connections to sites such as a mythical www.leatherknickers.com.

With the information supplied in this book, a network administrator could compile a list of sites to which to disallow connections at all costs, rather than having to compile a list of trusted sites, which would certainly mean much more work.

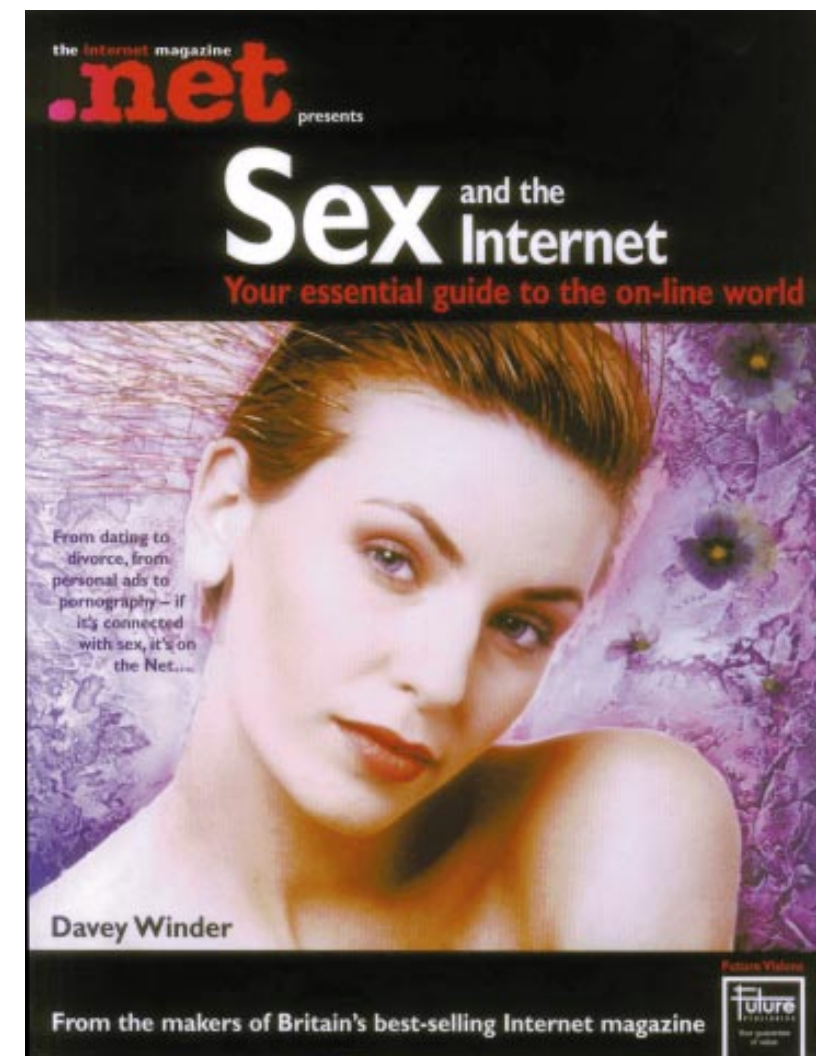
With this secondary strategy there would be loopholes, and the main use of a firewall is to prevent attacks on one's LAN from the outside. The economic reason behind blanking access to naughty sites is simply to prevent extraneous web browsing and time-loss during work-time.

Naturally, you wouldn't want young Thomasina, Richard or Harry browsing www.big-bits-of-anatomy-of-your-

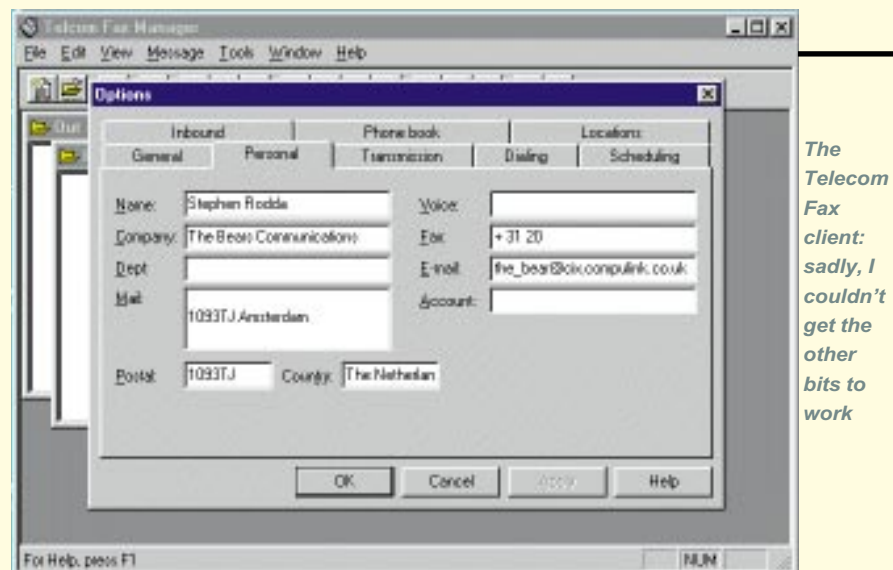
choice.com, so in an educational installation you'd probably only allow access to trusted sites. Apart from all that, it's entertaining and

a recommended read.

● *Sex and The Internet*. £12.99 from Future Publishing. ISBN: 1-85981-049-7.



You pays your money and you takes your choice: where to go, or where not to go, on the internet



The Telecom Fax client: sadly, I couldn't get the other bits to work

remote booting aspect. I've set up remote boot networks and although they work, and work very well, I don't think I'd do it again.

...I got the boot

● "Thanks for your reply." (See "Putting the boot in", above). "I actually solved the problem of the PROMs. There is a company in Canada called lanworks (www.lanworks.com) which claims that it can do the boot PROMs. However, I would like to find out more about Microsoft's pre-planned scheme of MAC addresses. Can you direct me on that?"

Ivan

ilabra@clink.samara.co.zw

It's not actually Microsoft's pre-planned MAC address scheme; it's the MAC addresses used by the card manufacturers themselves. Certain manufacturers use certain ranges of addresses and Microsoft uses the addresses to identify the cards. As long as your clone NE2000 card doesn't use, say, a 3Com address there's no real problem, but you'll have to edit the remote boot service's configuration manually. I'm afraid it's quite a messy business, but then remote boot usually is messy, anyway.

Making amends

"One of our NT Systems crashed. Following reboot, the disk administrator showed no file system on partition. The partition was a volume set with two volumes. Any idea how I might recover this partition?"

Do you know of a tool which can find the partition table of a drive containing

NTFS partitions where the table is lost?

Can someone post a place where I can download the NTFS package for Linux?"

Joerg Viermann

[<jv@cadlab.de>](mailto:jv@cadlab.de)

All you have to do is to start the machine with your NT installation diskettes and accept the "repair" option. The installation program will prompt for your recovery disk and should then repair this for you.

With regards to the Linux driver, email loewis@tiger.informatik.hu-berlin.de for information.

No entry

"I run Windows 95, and successfully connect to NetWare and Windows networks. I want to connect to the firm's ASI400s. I thought it was just a case of installing MSDLC, but it didn't do much good. I suspect it's not as simple as this. All I want for now is access to the drives — client access will come later. I notice that IBM have a 95 beta available.

The other option is TCP/IP, which we have running on the ASI400. If I have TCP/IP on Windows 95, I should be able to ping the 400. We have a standard ethernet connection to the 400. When we use 3.1 or 3.11, we use all manner of drivers. I presumed 95 would have this functionality built-in."

Paul Moss

pmoss@studley.jba.co.uk

Windows 95 has got TCP/IP built-in. The thing to remember is that TCP/IP is a transport protocol, much like IPX, but as in NetWare NCP you still have to run a filing

system as well.

Much the same is the case with TCP/IP. You have to have some form of file transfer protocol (or FTP). To use this, you have to have an FTP client on 95. Just type ftp from the command prompt, or use CuteFTP or some other commercial product, and run ftpd (the FTP daemon) on the AS/400, assuming it's not already running it.

Alternatively, install Samba on the AS/400 and then you can use NETBEUI over TCP/IP from Windows and mount drives properly on your desktop. To use Samba, you either have to use the Unix compiler on the AS/400 or download Samba from a ready-compiled source.

Samba is by far the easier option, although you may already be using NFS. If so, just install the NFS client onto the Windows 95 machines, direct from the CD. ■

Next Month: heavy testing

As a taster for next month, I've had a Hewlett-Packard Colour LaserJet 5 delivered for network evaluation, so that's going to be tested under all the operating systems I can throw at it.

I've got the promise of an AMD-powered 80586 machine to look at and contrast with the more traditional Intel Pentium, and I've also got hold of a couple of utilities which add NFS and TCP/IP to Novell NetWare 3.1x more cheaply than the Novell product.



Beating the system

New Mac-man, Howard Oakley, tackles System 7.5.3, looks at working with other architectures, and gives a mouseless driving lesson.

Having been handed Chris Cain's Hands On column, my intention is to maintain the high standards set by Chris in the past. I first wrote for PCW ten years ago and migrated to the Mac, in 1988, to develop software. Since then I have been an ardent Mac user, programmer, and evangelist.

Like Chris, I welcome your submissions and comments, and will endeavour to keep you productive, enthusiastic and informed. Now, to business...

System update

System 7.5.3, alias System 7.5 Update 2.0, rumbles on. In the US, problems have meant a further update to the update, but some of these repairs appear already to have been incorporated into the British English version.

My experience of applying Update 2.0

has varied from sublimely easy to horrendous. My three Macs are now running different Systems. My everyday workhorse, a IIcx which originally cost more than two limbs, remains on 7.0.1 much of the time because it runs my accounts and some golden oldies which I never got around to upgrading. Although I'd love to run something more glitzy, my Ritz accounts software has been trusty, requires minimal effort on my part and satisfies the VAT inspector. It illustrates one of the reasons why many of us use a Mac. It does what we want simply, cleanly and efficiently. Unfortunately, accounting systems often end up with a "Do not disturb" notice on the System Folder. I'm sure that some are still running under System 6 or earlier.

My Power Mac 6100 has been running 7.5.3 in various US and now UK

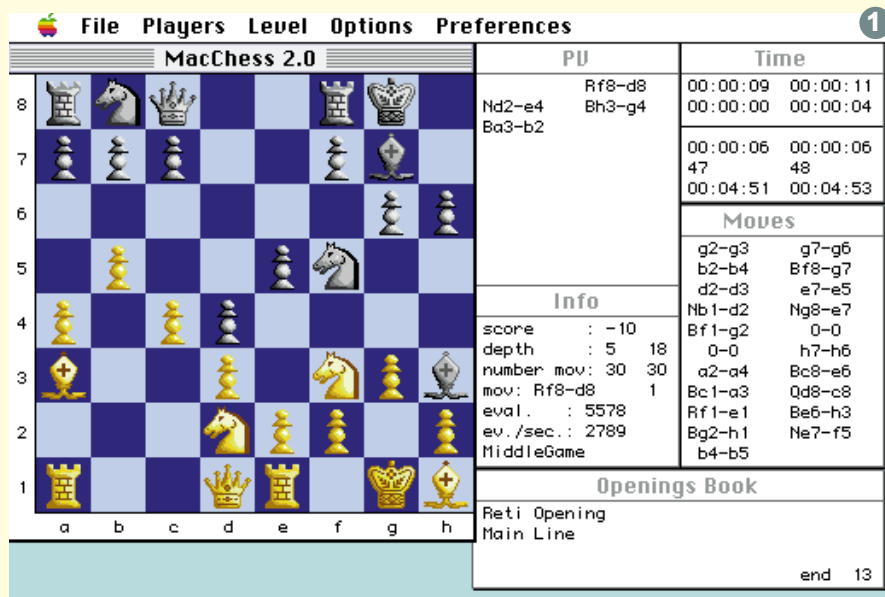
incarnations since Update 2.0 first hit the freeways and FTP servers. The only problems I have encountered were with disk drivers and screensavers. Ever since I first hooked up an external hard disk to it, then running System 7.1.2, I had infrequent and apparently random crashes. Once Update 2.0 had been installed, they became more frequent. Installing a clock accelerator to boost it to 84MHz made the crashes so common that they halted useful work. In the end, FWB's Hard Disk Toolkit solved it and I have put the rabbit's foot and other lucky charms away now.

The issue of hard disk drivers illustrates how far we have come, willingly or unwittingly, from Apple's original concept of the Mac as the simple-to-use computer. Before my IIcx I had a succession of Macs, from the SE to the IIcx, and relied almost entirely on Apple-supplied internal hard disks. If your Mac is equipped only with a standard Apple internal hard disk, the instructions provided with Update 2.0 to update its disk drivers should work a treat. With any luck, you shouldn't have to invest in a third-party "techie" product like the FWB Toolkit.

The increase of third-party hard disks has supported a whole industry producing software drivers. They are extremely low-level products which sit in between the System software, notably SCSI Manager, and the disk hardware, converting System calls to read and write from the disk into commands for the disk itself.

The one thing which was still troubling my Power Mac was its screensaver. Software which automatically blackens the screen is probably unnecessary. Modern colour monitors, with the excellent Sony Trinitron tube, do not appear to suffer from "burn in", even after years of use. After Dark is enormously and justly popular yet it does not seem to get on well with some Power Macs, particularly my 6100. Having tried a range of alternatives, such as the shareware application, Eclipse, I thought that I had found the answer in the freeware port of the Unix utility, "cron" (by Chris Johnson). But this, too, crashed every once in a while, typically when the IIcx accessed a shared folder on the Power Mac. Using the cron screensaver on its

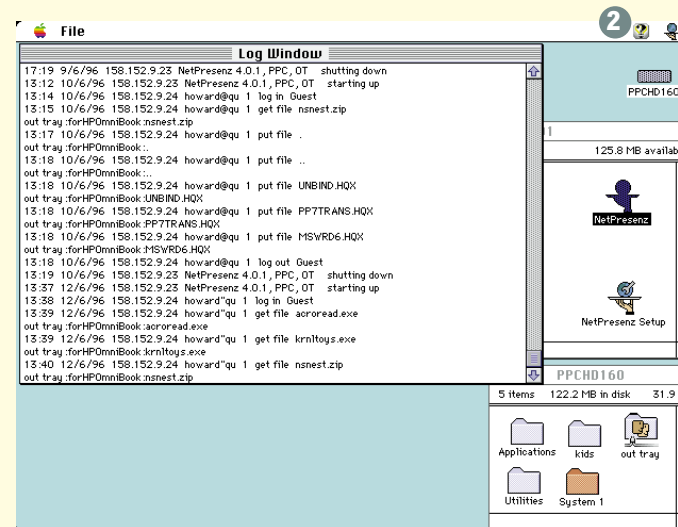
(1) Several chess games have fallen by the wayside as a result of recent hardware and System software introductions. One which has proven robust, attractive and a worthy competitor is WA van Beusekom's MacChess 2.0, for which he seeks only appreciative email or postcards



own resolved that last problem.

The other problem with Update 2.0 is communicating. If you have a PCI Power Mac you'll understand this only too well, having lived through Apple's struggle to get Open Transport fully usable. But it is not that simple, as there are still plenty of printers, modems and other peripherals which leave Open Transport standing.

A disappointing loss is Hewlett-Packard's fine PostScript driver for its older DeskWriter printers, such as the 560C. While HP has updated the regular non-PostScript driver, those of us who forked out the extra money to get excellent results from



(2) For a mere \$10, Net-Prezeng is a remarkably simple FTP server running native on Power Macs

System-level drivers have also broken, although their manufacturers are being much more conciliatory.

Working with PCs

Networking peer-to-peer in a purely Mac workplace couldn't be simpler. The only "nasty" likely to sneak up and ruin your day is when some of your Macs undergo

Illustrator or Freehand have been left out in the cold with a product which doesn't work with Open Transport. There isn't any promise of a future revision resolving this. Some smarter modems which use

a System upgrade: for instance, System 7.5 Update 2.0.

Before trying this, you need a copy of the current Network Software Installer, a single floppy available from Apple dealers. Install this on the other Macs and it will ensure that their AppleTalk drivers and other networking software are compatible with those undergoing the full upgrade. Using Macs networked among other Macs is often simpler than using other machines, such as IBM compatibles and Unix boxes, whether from a Netware or an NT server. Your only potential problem is making sure that system administrators become Mac-literate and don't try to abandon you.

Bringing PC clients into an all-Mac shop can be more fraught. I recently added an HP OmniBook to my little farm of Macs, but I don't wish to run a PC server or install more layers of networking software. The answer to this dilemma lies in TCP/IP protocols, which are ably supported by both MacOS and Windows 95.

First, I turn file-sharing on so the Power Mac 6100 is offering at least one folder to enabled users. If necessary, I open the TCP/IP control panel and make sure that

Mouseless Mac-ing

Apple's philosophy is that you drive your Mac with a mouse. There are occasions when a keyboard can be easier, or you might have started your Mac with the mouse disconnected or dysfunctional. Trying to plug your mouse, or any ADB (Apple Desktop Bus) device, back in while the Mac is powered up risks serious hardware damage. You must shut down your Mac before messing with the ADB chain. But without a mouse, how can you do that? Here are some essential keyboard shortcuts to save you time and the occasional motherboard!

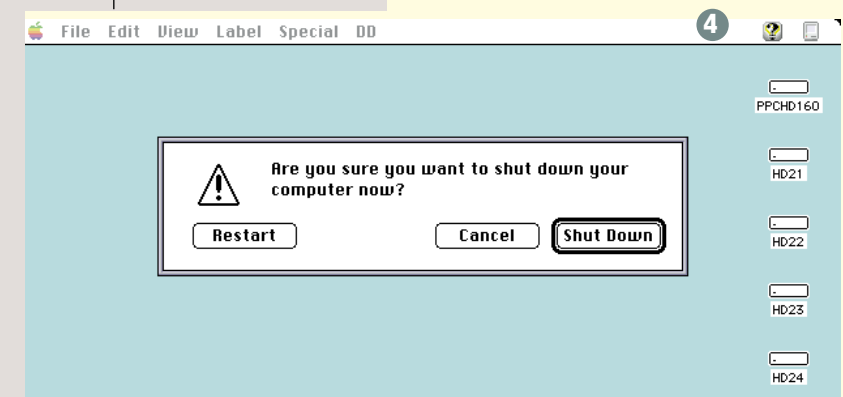
- Power key** Brings up a restart/shutdown dialogue (most Macs, System 7.5.x); see (4), below
- Cmd-Opt-Esc** Forces application to quit
- Cmd-Shift-Power** Forces Mac to restart

- Dialogues:**
- Return** Accepts default button
- Cmd-. or Esc** Cancels
- Tab** Moves to next entry field
- Shift-Tab** Moves to previous entry field

- Finder Views:**
- Arrow (cursor) keys** Moves selection
- Cmd-RightArrow** Expands folder in list view
- Cmd-LeftArrow** Collapses folder in list view
- Cmd-Opt-RightArrow** Expands folder fully in list view
- Cmd-Opt-LeftArrow** Collapses folder fully in list view

- File save or open dialogues:**
- Cmd-UpArrow** Moves up one folder level
- Cmd-D** Goes to Desktop
- Up and down arrows** Moves up and down file list
- Cmd-N** Creates new folder (save dialogue only)

(4) It's make your mind up time



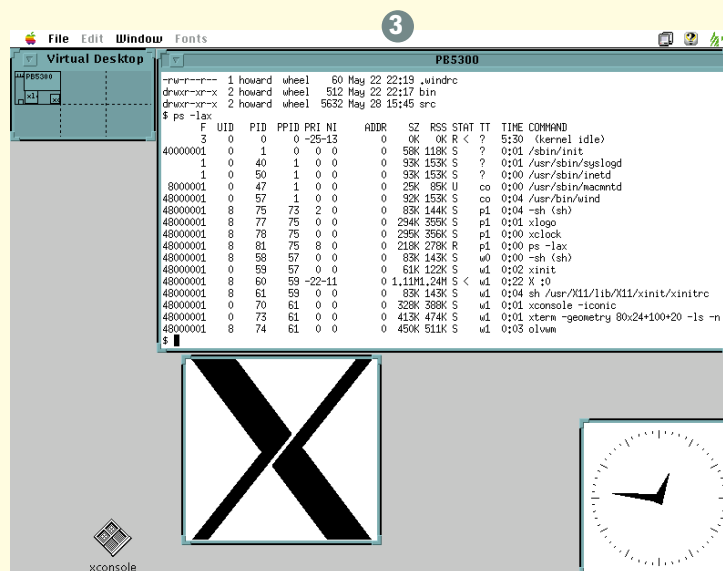
the Mac server has a valid IP address, such as 129.129.1.1, offered over the Ethernet, and does not rely on a name server. This also loads the TCP/IP driver into the memory. It is worth noting that one of the few remaining problems in Open Transport 1.1 is that repeated loading and unloading of this driver can lead to memory fragmentation and crashes. Whether you use it for local networking or dial-up connections to the Internet, if you use it often, opt for it to be permanently loaded into the memory.

Next, I start up NetPresentz 4.0.1, a ridiculously cheap shareware FTP server written by Peter Lewis. This is easily configured to allow named or guest (anonymous) access to all shared volumes or folders. All that remains is to start up an FTP client on the OmniBook. Under Windows 95 you will either have to go for the overkill of a full internet suite such as Microsoft's Internet Explorer or Netscape Navigator, or revert to power-user mode by running the command line FTP program at an MSDOS prompt. Something with the simple elegance of Fetch, which is Dartmouth College's freeware FTP client for the Mac, would fill this obvious gap.

Working with Unix

Connectivity with Unix systems is not a problem. If you're content with the basic functions expected of an internet connection, then the combination of System 7.5's MacTCP or 7.5.3's Open Transport and the rich array of public domain and commercial tools, is pleasant and productive.

Things are different if you need to run an X server. In its curiously inverted terminology, an X server runs on the client computer. Apple's MacX is long in the tooth and, until recently, WhitePine's eXodus was the only contender. Now, Tenon Intersystems has launched a mature competitor, XTen, based on its long experience with Mac-based versions of Unix. True to the Unix and X mould, it is profligate with resources and my Power Mac's humble 16Mb of memory were insufficient to let it fly. Once given the freedom of 32Mb on my PowerBook



(3) *PowerMach Ten is an implementation of BSD 4.4 Unix, including X11R5. XTen is an X11R5 server which can run with PowerMach Ten or as a standalone X server*

5300ce, it quickly got airborne and offered a full implementation of X11R6 with Motif and window managers, various.

Tenon is most famous for its implementation of Unix for 68K and Power Macs. As Apple decided not to port its own A/UX to the PowerPC processor it was, until recently, the only way that you could run Unix on a Power Mac. If this seems a bizarre intention, remember that Macs are commonplace in further education, particularly in the US.

Power MachTen is a delight to use. Running on top of the Mac file system in its own windows, you can even build hybrid MacOS and Unix applications using Metrowerks' CodeWarrior development system. If you discover that the only signal processing application requires Unix, it can be a lifesaver.

Previous efforts to build a public domain Unix for Macs had been less than ideal. MacBSD runs on a narrow range of 68K machines such as the IIci, although it is free. In the last few weeks, the first developer release of a Mac implementation of Linux, mkLinux, has become available. If you don't pay for your internet connection, you can now obtain it by FTP. Faced with a minimal download of 40Mb, I'll settle for the CD-ROM version from Prime Time Freeware, a specialist US publisher whose list includes such gems as a two-volume collection of artificial intelligence software.

The other small snag with mkLinux is that it only supports the first wave of non-PCI Power Macs.

Copland

All this concern would have been irrelevant had Apple shipped more multi-OS machines running Copland, or MacOS 8 as it is officially known. Long delays in finalising the specifications of what were initially PREP, and are now PowerPC Platform (PPCP) computers, along with delays in completing its micro-kernel architecture OS, were the last thing that Apple needed. It had to get the specifications right, or risk disaster.

The annual gathering at Apple's recent worldwide developer's conference had been expecting to receive alpha releases of Copland and were miffed to be told that not even a preview version could be provided. But they were given the first set of documentation, and movies illustrating its new look

and feel.

Over the coming months, I will be discussing the changes that MacOS 8 will bring and helping you to prepare your Macs for next year's upgrade. The chances are that your first view has been through Greg Landweber's shareware extension, Aaron (US composer Copland's first name). Ingenious though this is, it cannot portray the way in which MacOS 8 will allow users to set up their own personalised interface. Apple will call these functions "Themes". While I am sometimes aghast at the riotous use of clashing colours and customisations seemingly enjoyed by some users, Themes will provide the interface you want, even if it does ape Windows 95.

PCW Contacts

Howard Oakley welcomes feedback from Mac users and can be contacted at the usual PCW address, or by email as howard@quercus.demon.co.uk or hoakley@cix.compulink.co.uk or **CompuServe 70734,120**

Apple Computers 0181 569 1199;
www.apple.com; www.euro.apple.com
FWB Hard Disk Toolkit costs £129.25
(incl VAT) from MacLine 0181 401 1111
Cron, NetPresentz, Fetch, MacChess
and **Aaron** are on major online services
Tenon products from Shute Associates
01223 514531; and Full Moon
01628 660242

Prime Time Freeware
(001) 408 433 9662; email info@ptf.com;
www.ptf.com

Q“We have been trying to set up a US Robotics Sportster 28,800 to receive faxes automatically. Our plan is to receive faxes in background while the PC is being used for other processing, and print them later.

The PC is a 486 DX33 with 8Mb RAM running Windows 3.11. It will be running WordPerfect 6 for DOS, under Windows and Access 2.0. These may be open together, and it is possible that Lotus 1-2-3 R4 for Windows will also be open.

Is it practical to expect this system to cope without slowing the foreground application? If so, what fax software would you recommend? Quicklink II, as supplied with the modem, does not cope. It usually causes the PC to grind to a halt and the fax link to crash. Would you recommend upgrading to Windows 95, more RAM, or something else?”

The TACS Partnership

To get anything running alongside Access 2 in 8Mb of RAM you'd be doing well! For anyone running more modest applications, Delrina Winfax should do the trick and it doesn't slow things down too much. However, I wouldn't attempt it in your case as most of the programs you have there are well-known resource hogs.

I use a full-sized office fax machine which is designed to run day and night, for years. They are initially quite expensive to buy, but having the ability to receive faxes without fuss is important to me and to my clients.

If you must have your faxes arriving on a PC, I'd seriously suggest you get another small one to dedicate to that purpose and leave your existing machine alone. Sod's law says that your spreadsheet will decide to crash in the middle of receiving any important message, and unreliable communications are a real pain.

Windows 95 won't help you unless you upgrade your machine's RAM. For the selection of applications you propose, I'd recommend 24Mb as being sufficient. Windows 3.11 has its own fax software integrated with MS Mail, but it is rather awkward to use and is noticeably less efficient in terms of resource use than Winfax.

Going into overdrive

“I have a problem identifying my overdrive chip. I don't know if it is a socket 3, 5, or 7 type. I have an IBM PS/1 (manufactured in 1993). There is a 486 SX33 chip stuck to the motherboard and

Any questions?



Frank Leonhardt sifts through his postbag to see whether he can be of assistance in problem areas.

next to this is the overdrive chip. Right now, there's a 486 DX2/66 Intel overdrive chip in it, and I don't know what overdrive processor I can install.

The information I can give you about the overdrive processor is that where the overdrive socket is stuck to the motherboard, every pin connection from the chip to the board has a number or letter next to it. On one side there are numbers 1 to 19 (meaning 19 pins), and on the other side there are letters A to U (meaning 21 pins). If, from this information, you can figure out what kind of overdrive processor it is, I will be very much obliged.”

Rishid Shah
Nairobi, Kenya

You can never tell whether a particular overdrive processor is going to work until you try it. However, you should be able to plug a P24T Pentium Overdrive 83MHz into your machine.

Intel has recently priced this overdrive chip to about the same as a 486DX4/100, making it pointless to consider this lesser chip as a cheaper alternative. There's one catch: the BIOS in some machines won't

work with a P24T. As far as I know, the Award BIOS has always been okay, though. The AMI BIOS, unless it's within the last couple of years, has to be changed.

Before buying any overdrive processor, make sure the dealer knows what it is going to be for and is prepared to take it back if it fails to work. Although a chip may work in most machines of a particular type, you don't want to end up being the exception!

386 to 486 conversion

“I have a 386DX40 motherboard fitted with an AMD chip, with 128Kb cache and an IIT 387DX40 co-pro. According to the motherboard manual, it is possible to upgrade to a 486DLC 25MHz chip but this doesn't seem like a worthy upgrade. The current 386 processor fitted is of a surface-mount type that is soldered directly to the motherboard. It also has an unused space that is marked for a 386DX processor. There are jumpers on the motherboard that allow 25MHz, 33MHz and 40MHz configurations.

My questions are: firstly, is it possible to purchase a 486DLC 40MHz or similar

Frank's Bargain Basement

Two readers have taken me to task over my advice to T. Mancini in *Computer Answers* (May), where I wrote that £600 would not be enough to buy a PC capable of running current software releases. Both pointed me toward advertisers whose headline price appeared to prove me wrong.

Since I wrote that piece, RAM has fallen in price by over 50 percent, easily saving £100; but even now I still maintain that a machine suitable for current applications will cost more than this.

If you read the small print, you discover that the £499 “bargain” 486 machines come with certain important parts missing. You wind up paying extra to upgrade the memory to a usable 8Mb, then add a mouse, an operating system, postage, packing and VAT. Remember that current applications need a CD-ROM drive to install them (also extra).

One company in particular, mentioned by both correspondents, has around 30 outstanding County Court judgements against it and is well known by myself as well as the local trading standards office. I'm hardly likely to recommend them in these pages!

● *So here's a challenge: what is the cheapest new Windows 95 machine available? It must have 8Mb of RAM, a CD-ROM drive and all the necessary keyboards, mice, monitors and software (on CD-ROM), a year's warranty and be on sale to the public.*

We're all DOOMED... or are we?

Doom and disaster will visit all computers one year before the end of the millennium. It's true! By the time you read this, questions should have been raised in Parliament about the year 2000 bugs, and the government will be whipping up a right bally-hoo about it. The theory goes that when computers' clocks change from 1999 to 2000 it will expose bugs in lots of software — and there is some truth in this.

Early last year, I asked readers to perform a little test to see whether their PCs' clocks could cope. Most didn't. (If you want to try it yourself, set the clock to 31st December 1999 at 23:55 and turn the machine off for ten minutes.) Over 80 percent of PCs you tested thought it was something other than the 1st of January 2000 when turned back on. And, before any more smug Amstrad 1640 owners write to me, I know this is an honourable exception!

It will be an annoyance, certainly, but I haven't yet found much in the way of PC software which suffers a serious problem. Mainframes are a different story, as most of their software is written using COBOL. Unlike modern programming languages which store years as full binary numbers, a lot of COBOL-type software packs a two-digit year into eight bits using a system called Binary-coded Decimal.

So why is there such a problem? Consider a program which checks to see whether a 25-year life insurance policy has matured. The logic might be "if this-year minus starting-year equals 25, then



*Will the end of the millennium take your PC by surprise? Find out by zooming it forward to the year 2000...**

pay-out-time". This is fine if you are subtracting 1980 from 2005, but disastrous if the years are only two-digit (i.e. 80-05).

Mainframe users will doubtless be hiring self-styled year 2000 experts, at exorbitant rates, by the coachload. Some of these will try to make you think your PCs are in great

danger, too. They're almost certainly not, but if you want to be sure, all you have to do is back up all your data, set the clock to 2000 and see what happens.

My free advice to mainframe managers is to start dealing with it now. Either that, or convert all your investments into gold bullion and book an extended Christmas break in 1999. Two years should be long enough.

clock-doubled chip?; if so, will it work on my motherboard? Next, would the co-pro need to be changed if upgrading is possible? And finally, what would be the price of such an upgrade, and would it be too expensive to be worthwhile?

A performance increase of a factor between 50 to 100 percent only is required and I am happy to de-solder the current 386 chip if necessary."

A. Knight
East Sussex

I'm afraid you would be wasting your time trying to upgrade this motherboard. The 486DLC was actually a special 486-compatible chip which fitted into a 386 socket. It wasn't as fast as a standard Intel 486, but it did support 486 instructions.

However, this is all academic as I've been unable to track down anyone who still sells the chip, and I am unaware of anything else you could use to get a reasonable performance boost for the money. Cyrix does a set of 386 to 486 converters, the fastest of which operates at an external clock frequency of 33MHz and costs £150. For the same money, you could buy a new 486DX4/100 motherboard with 16Mb RAM. Add about £50 for a reasonable Pentium 75. If your budget is really tight you may be able to find an old motherboard (£50) which would take your 30-pin SIMMs and use a 486DX2/66 compatible processor in it, costing around £20.

SIMMple explanation

"I am considering buying some extra SIMMs to speed up my PC. Friends of mine, to whom I have mentioned this, hold different views: some say, yes, it will speed up; others, who have tried it, have been disappointed with the results. I am now totally confused. Help!"

C. Brewer

During the past few years of high RAM prices, a myth has grown up that processing speed is a function of memory size. This is based on the observation that a machine which runs Windows slowly can be speeded up by doubling its RAM. The belief that increasing RAM size always leads to a speed improvement follows on from this, with some users rating machines by memory size and disregarding the processor entirely.

So what has memory size got to do with speed? Consider an analogy. Supposing you had a Luton van and a motorbike. The bike has the fastest engine (processor) but the van has lots of room in the back. Now suppose you were in a hurry to send a copy of PCW from

London to Oxford. The motorbike is the obvious choice.

Okay, supposing you needed to deliver 20 copies. Again, the bike would be quicker even though it might wobble a bit. Above 20 copies, though, load carrying capacity comes into play: the van, trundling up the M40 at 50mph, can deliver a large consignment of magazines in far less time than the motorbike (which would take several trips).

So think of the magazines as being the software. When the software fits into the available capacity, the speed of the processor is paramount. As soon as it doesn't fit, the processor has to go mad juggling small chunks.

It's exactly the same within a computer. If the software you are running fits into the machine's working storage (called RAM these days) all will be fine. But try to fit in something too large and you get a very steep fall-off in performance. If you have more working storage than you require, it is just wasted. Unlike the Luton van, you aren't being slowed down by dragging the unused box-shaped coachwork behind you.



PCW Contacts

Delrina 0181 207 3163

• Upgrade Processors:

Powermark 0181 956 7000

Simply Computers 0181 498 2100

Intel 01793 431155

* Film-still from *Diamonds Are Forever*; courtesy of the National Film Archive



Programming primer

Pay attention at the back! Eleanor Turton-Hill provides an overview of programming principles and common structures.

A computer program is nothing more than a sequence of instructions which are designed to make your computer behave in a certain way. There are literally hundreds, if not thousands, of programming languages and they are all different. Some have only superficial differences, while others differ hugely. Nevertheless, all programming languages have *some* things in common: they all attempt to describe the processing of data, and because of this they all share certain basic facilities.

Here, I'll be giving an overview of programming principles and common structures (and if you're about to embark on a programming course, this will give you a good head start). Once you've understood the basic principles of programming, you should be able to get to grips with practically any language.

What is a computer program?

Computers are not very intelligent things. They can't philosophise on the meaning of life, but they are very good at performing boring, repetitive tasks very quickly and very accurately.

Deprived of a program written by a human being, a computer can do nothing. If a program is badly written, it can very obediently turn perfectly good data into complete gibberish... just one small error can alter the behaviour of an entire application.

There are three basic facilities which all programming languages must have. Firstly, they must have some way of representing data and performing operations on it. Most provide some form of primitive data and structured data, and some allow you to create your own data types.

Secondly, programming languages must provide some kind of evaluation mechanism; some way of describing the way in which you would like the data to be transformed.

Thirdly, every programming language must have a set of naming and declaration rules. These rules state when you can and cannot refer to other elements of a program.

Constants and variables

Most computer programs use some numbers which do not change their value throughout the duration of the program. These values are called constants and are usually declared at the beginning of the code.

The rate of VAT, for instance, is a figure which may be referred to many times in a program but always as the same value.

Arrays

```
c p y r z o i j
```

This is a one dimensional array or simple list. Each of its elements is referenced in an index so that its data contents can be uniquely identified.

```
w m i q u x f o
c p k d j a c g
```

Arrays can have any number of dimensions. This is a two dimensional array or list of lists. Each element can still be uniquely identified, only it requires one value from each range.

This can be declared at the beginning of the code (e.g. VAT = 17.5). Then, every time you need to use the figure, you can simply refer to "VAT". What's more, when the rate of VAT alters, all you need to change is the constant declaration at the top of the code.

A variable, as you've probably guessed, is a value which changes throughout the program. The value of a variable can be altered and manipulated by the program, and certain operations may be performed, depending on its value. All constants and variables have names and values.

Data types

Before a variable can be referred to in code, it must first be declared and given a data type; the program needs to know the type of thing with which it is dealing.

Most programming languages acknowledge several data types, the major distinction being between text and numbers. In Pascal, there are four basic data types: char (for character strings), int (for integer values), and real (for double precision real numbers).

There is also a Boolean type which is used as a flagging mechanism. A Boolean variable can hold just one of two values like Yes/No, or On/Off, or 1/0.

Another data type used in most programming languages is the array type. This is used for managing lists. When an array is defined, it is given an index which enables you to uniquely identify any one of its elements (see *Arrays, above*).

Controlling program flow

Every language has different conventions for beginning a program. In both C and Pascal, programs start with the reserved word "main". This makes it clear where execution should begin (*Fig 1*).

The following text shows three basic control structures which are universal in procedural programming languages. Each structure has variations and each is written slightly differently, depending on the syntax rules of the language you're using. Here, I've made the examples simple and used pseudo-code to illustrate their structure.

● IF THEN ELSE

The IF statement is probably the easiest programming structure to understand. It

Fig 1 A 'main' point

C	Pascal
main () {	PROGRAM main (input,output);
definitions;	definitions
statements;	BEGIN
}	statements
	END.

What is object-orientated programming?

There's been much confusion recently about the meaning of the term "object-orientated". This is largely because it has been bandied about by all and sundry to mean a multitude of different things. Put simply, object-orientated programming is a collection of design principles for writing code. It is only supported by some languages and aims to break programs down into manageable units called "objects". The core idea behind this is to make components which are sufficiently general purpose as to enable them to be re-used in other programs.

This method of designing code yields many advantages. Firstly, a program which is divided into independent chunks is easier to understand, easier to debug and generally easier to maintain. Secondly, if many of those chunks are re-usable, time will be saved in future projects. Thirdly, an application made out of many independent parts can be more easily created by teams, thus increasing productivity.

The first object-orientated programming languages (Simula and Smalltalk) were conceived more than 20 years ago, but it's only recently that people have started taking its principles seriously. C++ is now the most popular object-orientated language. Objects within C++ can correspond to real-world entities such as bank accounts, employees or customers. But they can also correspond to computer hardware and software components such as communications ports, or video display windows, or data structures such as stacks or lists.

What are classes?

Many of the objects that a program uses have the same structure. A program which simulates the operations of a bank, for example, will need many account objects and many customer objects. Once the structure of an object has been set up, it is possible to produce many copies of it. This is done by using "classes"; each contains a complete description of one kind of object. Truly object-orientated code must have the three essential characteristics of inheritance, encapsulation and polymorphism. This may sound frighteningly technical, but in fact the whole thing rests on three fairly simple concepts.

One: classes can be defined from scratch, or they can be created by modifying an existing class. Derived classes take on all of the characteristics of the existing class, plus any modifications. This is called inheritance, and can save you an incredible amount of time and effort in code writing. Two: objects are available to the programmer through an interface which responds to a limited number of different kinds of message. The internal structure of individual objects is hidden from the programmer and this data hiding, or encapsulation, simplifies the use of objects. And three: a major attribute of an object-orientated language is that all the objects of the derived classes of a parent class are type compatible. This means that a derived class can be used anywhere that the parent class is expected. This is called inheritance polymorphism and enables clients of a family to see a simple uniform interface.

will execute one or other group of statements depending on the value of a condition. We use this structure in normal language all the time: "If it's sunny, we'll go out, otherwise we'll stay at home".

In code, it looks more like this:

```
IF condition true THEN
    instructions
ELSE
    instructions
END IF
```

● WHILE DO

The WHILE statement is iterative rather than conditional. It will execute a statement continually until a condition no longer holds. This translates to normal language something like this: "While John is well, he will keep working. If he is unwell, he will stop".

In code, it looks something like this:

```
WHILE Condition is true
    DO Instructions
WEND
```

● FOR..NEXT

The FOR..NEXT control structure is also a repeating routine. It is used to execute a single statement, a specified number of times: "For the next five days, I'll be going to work".

In code, it looks rather like this:

```
FOR
    n=1 TO 5
Instructions
NEXT
```

Structure

Once you've got used to the idea of vari-

There are plenty of good programming tutorial pages on the internet. Check out this one, written by Steve Holmes of the University of Strathclyde, for some lessons in C: <http://www.strath.ac.uk/CCI/Courses/NewCourse/ccount.html>



ables, data types, and basic control structures, you're ready to start writing simple programs. But when your code starts to become more complex, then you'll have to learn about scope rules and structure.

It's easy to turn a perfectly good working program into complete garbage if you don't follow a few design principles. Your program may still work quite well but will gradually become unreadable and, worst of all, unmaintainable.

Over the years there have been many theories about how programs should be designed. The idea of the procedure emerged in the seventies with C and Pascal. It attempted to break code down into manageable and well-specified chunks, making it easier to write and maintain, especially by large teams. This "modular" style of programming, which is based on

the idea of packaging data and functions, developed into what is now known as "object-orientated" code (see the box, above).

If you are thinking of learning a programming language, there are plenty of ways to get started. Turbo Pascal and Turbo C++ are both available from Borland, in DOS and Windows versions. Microsoft offers a Visual Basic Pro and Visual C++ Student Pack which you can get for a street price of about £80. ■

PCW Contacts

Eleanor Turton-Hill welcomes any feedback and suggestions from readers. She is at ellie@pcw.cmail.compuserve.com

Borland 0990 561281
Microsoft 01734 270000



response times?

- Check the technical support. Is it free? Is it easy to get through to?

PCW Minimum Specification

This is the absolute minimum spec we think you should even consider buying now. It's suitable for general business use: word processing, databases and spreadsheets.

- Windows 3.11
- 486 DX4 100 MHz processor
- 8Mb RAM
- Graphics card with 1Mb of memory
- 540Mb hard disk
- 3.5in floppy disk drive
- Double-speed CD-ROM drive
- 14in colour monitor
- PCI local bus

If you're buying the PC for home use, you'll probably want full multimedia capabilities so that you can use CD-ROM games and edutainment products and play video clips. This should include at least a

- 16-bit SoundBlaster-compatible sound card
- Speakers

PCW Recommended Specification

If you're not completely strapped for cash this is the PC specification we recommend. No-one who works at PCW would settle for less.

- Windows 95
- Pentium 90MHz or 120MHz processor (a faster processor will make your computer run more quickly and smoothly)
- 256Kb secondary cache (again this makes your computer run faster)
- 16Mb EDO RAM. 16Mb of memory speeds your PC up a lot, particularly if you're multitasking (using more than one application simultaneously)
- Graphics card with 2Mb of memory
- 1Gb hard disk — modern computer software takes up a lot of space
- 3.5in floppy disk drive
- Six-speed CD-ROM drive (video clips will play more smoothly; you will be able to access files on CD-ROM disks more quickly)
- 15in colour monitor (one inch doesn't sound a lot, but is easier on the eyes)
- 16-bit SoundBlaster-compatible sound card
- Speakers
- PCI local bus

For up-to-date PC reviews, see our August '96 cover story

Buying a PC

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modern software.

Things not to do when buying

- Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
- Make sure Pentium motherboards have an Intel Triton chipset.
- Avoid cheap 14in monitors.

Things to do when buying

- You can never have too much disk

space. Spend extra cash on the next hard disk size up.

- Memory is expensive, but extra memory often makes more difference than a faster processor.
- Look at the bundle. What other software is included — is it worth having?
- Check the warranty. Is it for on-site or back to base repairs? If it's on-site, does the manufacturer offer guaranteed

PCW Best Specification

Our Best Spec is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need to add even more memory, a bigger hard disk, a more powerful graphics card, or a larger monitor.

- Windows 95
- Pentium 166MHz PC
- 512Kb secondary cache
- 32Mb EDO memory
- 2Gb hard disk
- 3.5in floppy disk drive
- Eight-speed CD-ROM drive
- 17in colour monitor
- 4Mb VRAM graphics card (this means your graphics card can display more colours and a higher resolution on your monitor — 16 million colours at a resolution of up to 1280 x 1024)
- 32-bit sound card
- Quality speakers
- PCI local bus

Other things to consider

PCs have become a lot more similar in the last few years. The days when smallish computer companies designed their own chipsets (the computer chips that assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design their motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Buying a NOTEBOOK

Notebooks are one area in which it's often safer to stick to brand names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability does seem to be a problem and it can be fiendishly difficult to obtain spares. The other useful guideline for notebooks is to try before you buy.

Standard notebook specifications are generally a step or two behind the desktop equivalents. For example, quad-speed CD-ROM drives are still not standard on notebooks, whereas on desktops the six-speed variety is already well established. The latest generation of colour screens can cope with 800 x 600 resolution, but that's still a step behind the desktop 1,024 x 768 standard.

What to look for in a notebook

There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).

• **CD-ROM drives** are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.

• **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. Again, if the notebook is to be your only machine, specify both. Otherwise, reinstalling an operating system can mean returning the machine to the manufacturer.

• **PC cards** Modern notebooks all have at least one PC card slot. They take credit-card sized expansion cards which can add a fax-modem, a network interface card or even an extra hard disk to your computer.

• **Battery life** Battery technology keeps improving, but unfortunately the power demands of ever more powerful notebooks tend to keep pace. Battery life varies from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now largely replaced the



older Nicad (Nickel Cadmium) batteries.

- **TFT screens** TFT or active matrix screens are starting to replace the slower dual-scan or passive matrix screens. It means the screen image is refreshed much more quickly.
- **Warranty** Drop a notebook and it may well break, so it is especially vital to check the

terms of your warranty. How long is it? What level of service is provided?

PCW Minimum Specification

Notebooks change rapidly. It's often possible to pick up end-of-line machines with 486 processors from brand-name manufacturers such as Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use. They probably aren't up to running Windows 95.

PCW Recommended Specification

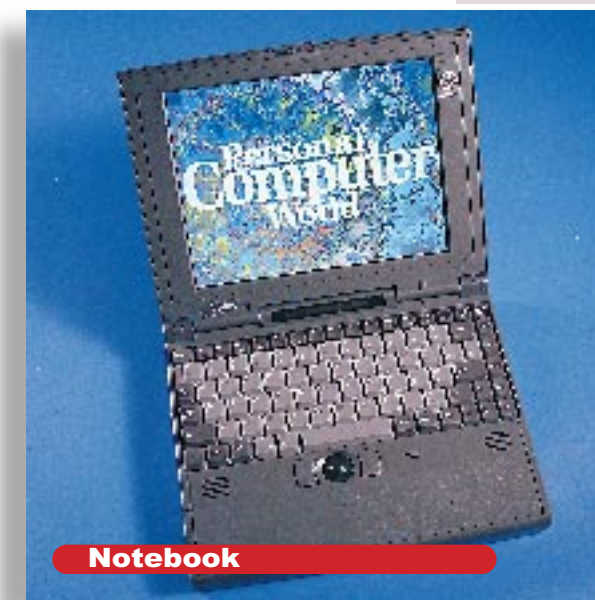
- Windows 95
- Pentium
- 256Kb secondary cache
- 16Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 500Mb hard disk
 - 3.5in floppy disk drive and/or dual-speed CD-ROM drive.
 - Dual-scan screen.

PCW Best Specification

The state of the art notebook.

- You're either loaded, or your company's picking up the tab.
- Windows 95 or Windows 3.11
 - Pentium
 - 256Kb secondary cache
 - 16Mb RAM
 - On-board graphics with 2Mb of VRAM memory, PCI local bus
 - 1Gb hard disk
 - 3.5in floppy disk drive
 - Quad-speed CD-ROM drive
 - Active matrix TFT screen
 - Long battery life

For the latest notebook reviews, see next month's PCW



Notebook

GLOSSARY OF COMPUTING: IMPORTANT TERMS AND ACRONYMS

A**Access Time**

The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average, as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Acronyms

These form most of the technobabble which has been refined over many years to confuse you, the user, and keep us, the writers, in business. Try to take as little notice as possible of it: the computer industry is littered with TLAs (Three-Letter Acronyms).

Applications

An application, or package, is one or more programs used for a particular task: for example, word processing, invoicing or spreadsheeting.

Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for more specific uses.

ASCII (American Standard Code for Information Interchange)

Usually a synonym for plain text without any formatting (eg italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B**Backwards compatible**

Compatibility of hardware or software to older versions of the product or standard.

Baud rate

The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V* and Bit)

BIOS

Basic Input/Output System (pronounced buy-oss). Software routines that let your computer address other devices like the

keyboard, monitor and disk drives.

Bit

Binary digit, the basic binary unit for storing data. It can either be 0 or 1. A Kilobit (kbit) is 2^{10} , 1,024 bits; and a Megabit is 2^{20} , which is just over a million bits. These units are often used for data transmission.

For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1,024 kilobytes (Kb) and a Kb is 1,024 bytes. A Gigabyte (Gb) is 1,024 Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot

Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press Ctrl Alt Del) or a cold reboot, where you switch the computer off and back on again.

Bulletin board systems (BBSs)

A kind of electronic forum now being replaced by the Internet. (See *net.newbies*, p211)

Bus

A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST

Cache On A Stick.

CD-ROM

A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data—equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, but this makes them ideal for archiving.

CISC (See RISC)

CPU

Central processing unit. Normally



refers to the main processor or chip inside a PC. (See Processor)

Crash

Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software), or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)

Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)

Common measure of the resolution on a printer, a scanner or a display.

Drive controller card

An expansion card that interprets commands between the processor and the disk drives.

Drivers

Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac, just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)

A bus standard designed to compete with MCA now being replaced by PCI. Its advantage was that it was designed to be backwards compatible with the now-ancient but still dominant ISA interface (as the name implies).

Electronic mail (E-mail, email)

(See *net.newbies*, p211)

Expansion card

Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external one (which

is more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F**Floppy disk drive**

Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy 5.25in disks.

Fonts

A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. Modern TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format

To wipe a floppy or hard disk in order to prepare it to accept data.

GPF

General protection fault.

Graphics Card

An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)

(See Windows)

H**Hard disk**

Sometimes called a fixed disk, hard disks are hermetically-sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb, but disks of up to 9Gb are available.

Hardware

All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)

The standard language used in the creation of World Wide Web pages.

I**IBM-compatible**

Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

Internet

(See *net.newbies*, p211)

IDE

Integrated drive electronics. A control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features. EIDE can support four external devices including hard disks and CD-ROM drives.

IRDA

Infra Red Data Association—standard for exchanging data using infra-red typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)

This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI)

ISDN Integrated Services Digital Network

A digital voice and data telephone network which looks set to replace the current analogue one. ISDN adaptors are already starting to replace modems as a fast way of accessing the Internet and transferring data.

JPEG (See MPEG)

Kbit (kilobit), Kb (kilobyte)

(See Bit)

L

LAN (Local Area Network)

(See Network)

Local Bus

PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it has now largely replaced.

M

Macintosh (Mac)

A type of personal computer, made

by Apple, that is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows, except that it predates it and (in many people's view) looks and works much better.

Maths co-processor

A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)

Mb (Megabyte) (See Bit)

MCA

A kind of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)

A standard for compressing video available in several flavours: MPEG 1, MPEG 2 and MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory

The term normally refers to RAM (Random Access Memory). This is the kind that disappears whenever you turn your computer off and is much faster to access than a hard disk. It acts as a kind of staging post between your computer's hard disk and its main processor.

•DRAM Dynamic Random Access Memory
This requires its contents to be replaced every 1/1000th of a second and is the most common form of memory in PCs.

•SRAM StaticRAM

Retains memory until the power is switched off.

•VRAM VideoRAM

Faster than DRAM, this is used by graphics cards.

•EDO Extended Data Out RAM

The latest type of memory, offers improved performance.

Cache memory

Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of cache built in. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is also often used to cache your hard disk.

ROM Read-Only Memory

A kind of memory that can only be

read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

Modem

The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers. They are commonly used for sending electronic mail and accessing the Internet. (See *net.newbies*, page 210.)

Monitor

Your computer's screen. Signals are sent to it from the video card.

Motherboard

The main printed circuit board which houses the processor, the memory and various other components.

N**Network**

A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. Typically, all the PCs on a LAN are connected to one server, a powerful PC with a large hard disk that can be shared by everyone. There are many other forms of interlinking computers including WANs (Wide Area Networks).

O**Operating System**

The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P**Package**

(See Application)

PC Card

Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)

Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local Bus)

PCMCIA (See PC Cards)

Parallel Ports

Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pixel

Picture element. The smallest possible addressable dot displayed on a monitor.

PowerPC

This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor

The chip that does most of a computer's work.

Programs (See Applications)

Public Domain

Software that is absolutely free. The author usually retains copyright, but you can make as many copies as you want and pass them to other people. Public domain software often consists of small utilities the author feels might be useful to other people. It is often confused with shareware.

Q**QWERTY**

The name of a standard English language keyboard, derived from the first six letters on the top row. The French equivalent is AZERTY.

R

RAM Random Access Memory (See Memory)

Reboot (see Boot)

RISC

Reduced Instruction Set Computing. These are starting to replace CISC (Complex Instruction Set Computing), as they are generally faster. The PowerPC chip is a typical example.

ROM (Read Only Memory) (See Memory)

RTF Rich Text Format (See ASCII)

S**SCSI**

Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs. It is commonly used for connecting devices such as hard disk drives and CD-ROM drives.

GLOSSARY OF COMPUTING: IMPORTANT TERMS AND ACRONYMS

Serial Port

The serial port, of which there are sometimes two (com1 and com2), is used by your PC to communicate with the outside world. Serial ports are predominantly used by modems and similar devices, which communicate quite slowly. Some mice also use them. Faster communications are achieved via the parallel port.

Shareware

A way of distributing software which is often used by smaller programmers rather than big software houses. It is freely available, but not free. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)

The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities of up to 16Mb.

Software

A generic word for programs or applications.

T

Tape Streamer

Magnetic tape recorder designed for backing up data from your hard disk.

U

UART (Universal Asynchronous Receiver Transmitter)

Pronounced you-art. A chip that allows your PC to cope with high-speed communications.

V34, V32bis

A series of CCITT standards that defines modem operations and error correction. There are over 20, but the key ones are:

- V32.bis, the standard for 14,400bps modems.
 - V34, the new standard for 28,800bps modems (see Baud).
- Don't buy a modem that doesn't comply with one of these standards.

VESA

(See Local Bus)

VGA

Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)

VRAM (See Memory)

W

Windows

A GUI (Graphical User Interface) developed by Microsoft. Windows is supposed to make programs easier to use by giving them a standard, mouse-driven interface.

Windows 3.11

16-bit operating system.

Windows NT

Robust, fully 32-bit operating system. Currently has the Windows 3.11 interface, but will soon be available with the Windows 95 interface.

Windows 95

Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.

WYSIWYG

An acronym for What You See Is What You Get, used to describe much modern software. What you see on the screen is exactly what you see when you print your work out.

Z

ZIF (Zero Insertion Force)

Sockets used for large CPUs. Lifting a handle lets you remove the processor.

ZIP

Better known as PKZIP, this is a widely used shareware utility that compresses files, so that they take up less room. You can tell when you have a ZIPped file as its name ends in ZIP. It is widely available from bulletin boards. PKZIP is the most common form of compression of its kind.

Glossary ends

Continued from page 327

Buying a PRINTER

There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work pretty much like photocopiers, and are cheap to run and print quickly. Their disadvantage is higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

Types of laser

PCs work by sending a description of the page that's being printed down a printer cable. There are three commonly-used page description languages (PDLs):



Laser printers

PCL

This stands for Printer Control Language, and it is Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers.

PostScript

This sends an outline in vector form (see "Drawing Software") to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so that the image looks the same on a monitor (75dpi), a laser printer (300dpi) or a professional image setter (2400dpi).

Printers using this tend to be cheaper than PostScript ones, but output will vary from one printer to another, making it less suited to professional use.

GDI (graphical device interface)

These printers download the description of your page already used by Windows



Inkjets

Inkjets

Inkjets work by spraying ink onto paper. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good-quality colour.

straight to your printer. They will only work with Windows, but are cheap and fast. They are also only suitable for a personal printer and will not work across a network.

Recommended Products

Cheap lasers Epson EPL-5500: Epson 0800 220546; street price £300 (see PCW February '96)

Sub-£750 lasers Hewlett-Packard 5P: Hewlett-Packard 01344 369222 (see PCW November '95)

Network lasers Hewlett-Packard 5P: Hewlett-Packard 01344 369222 (see PCW February '96)

Recommended Products

Epson Stylus 800 colour: Epson 01442 61144; street price £350 (see PCW August '95). **Canon BJC-610:** Canon 0500 246246; street price £370 (see PCW, February '96).

Hybrids

For home use and small offices a hybrid could be the answer. These combine a printer, a fax machine and some copying capability in one unit.

Recommended Products

Hewlett-Packard OfficeJet LX: HP 01344 369222; street price £499 (see PCW December '95)



Hybrid printer

Buying a SCANNER

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

The most common type of scanner. They range in price from £300 to over £3,000. They're capable of scanning colour pictures to a high standard. Most have transparency adaptors as an optional extra.

Document scanners

This is a new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forte.



Flatbed scanners

Recommended Products: Flatbed Scanners

Professional — Arcus II: Agfa 0181 231 4200; street price £2,600.
Intermediate — Epson GTX 9000: Epson UK 01442 61144; street price £750.
Budget — Umax Vista S6E: IMC 01344 872800; street price £299 (PCW, Sept '96).

Recommended Products: Document Scanners

Visioneer PaperPort VX: Computers Unlimited 0181 200 8282; street price £299. **Logitech PageScan Colour:** Logitech 01344 894300; street price £299.
Plustek PageReader 800: Scan Direct 01292 671676; street price £149 (PCW, March '96).

Buying a FAX-MODEM

You'll need a modem to connect to the Internet or an online service such as CompuServe or AOL, and to send and receive email. Modems are available in three formats: as PC cards to plug into notebooks, as external boxes, and as expansion cards. PC card modems cost the most and external modems cost slightly more than the expansion card variety.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have fax capability built in, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14,400Kbits/sec modem is adequate. However, prices have now fallen so rapidly that a V34 28,800Kbits/sec modem is probably a better bet.

Recommended Products: Fax-modems

External — Motorola 3400 Online: Motorola 01923 404343; street price £160 (see PCW February '96)



Fax-modem

Buying a CD-ROM DRIVE

Just about the only things which differ on today's CD-ROM drives are their speed and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on many sound cards.

The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/sec. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/sec, and quad-speeds twice as fast again, raising transfer to 600Kb/sec.

Six-speeds are currently the standard (900Kb/sec), with eight-speeds (1200Kb/sec) becoming increasingly common.

All figures are theoretical maximums. Buyers should go for quad-speed or higher. There



CD-ROM Drives

is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE quads start at around £100 and six-speeds around £130.

Recommended Product: CD-ROM Drive

Teac CD56-E six-speed: fitted to many new PCs and costing around £85 (PCW January '96). The Goldstar 8X is a good 8-speed choice for around £99 (PCW Aug '96).

Buying a MONITOR

Regardless of your computer application, you'll be looking at your monitor all day — so get a good one.

Some people claim not to see monitor-flicker, but your brain will, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors. Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes.

The resolution refers to the number of dots (pixels) horizontally and vertically on screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The

more pixels, the more you'll be able to fit on screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 by 768, non-interlaced, at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in may only have 14.5in, and a 17in only 16in.

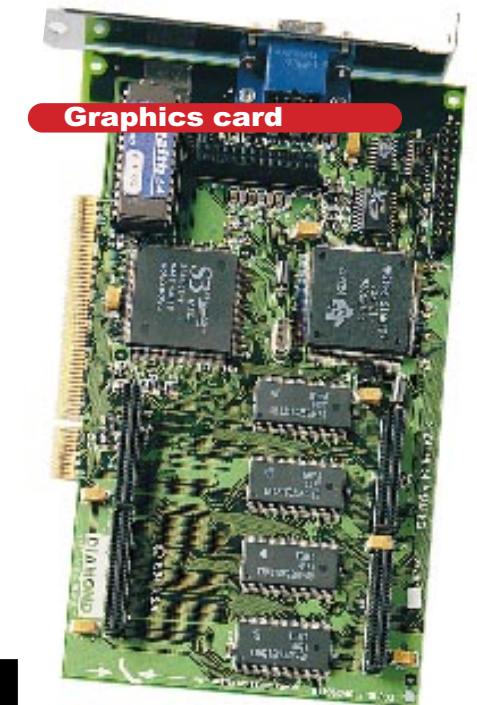
Recommended Products: Monitors

For 15in try the CTX 1569MS (around £300) or the **NEC M500** multimedia around £410 on the street. At 17ins there's the **Sony 17sfl** or the **Taxan Ergovision 730TCO-S** at around £500 (PCW July '96).

Buying a GRAPHICS CARD

The graphics card sits inside the PC and controls the features that the software can display on the monitor.

Check the amount of memory on the card. 2Mb is about standard these days, 1Mb is skimpy and 512Kb is barely usable. Also, check out the performance capability of the card. Video cards come



Graphics card

as 16-bit, 32-bit, 64-bit and even 128-bit — all you need to know is that a large number of bits means faster performance and more colours.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on the screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz. The refresh rate is important, as it relates to the flicker that you will perceive from your monitor.

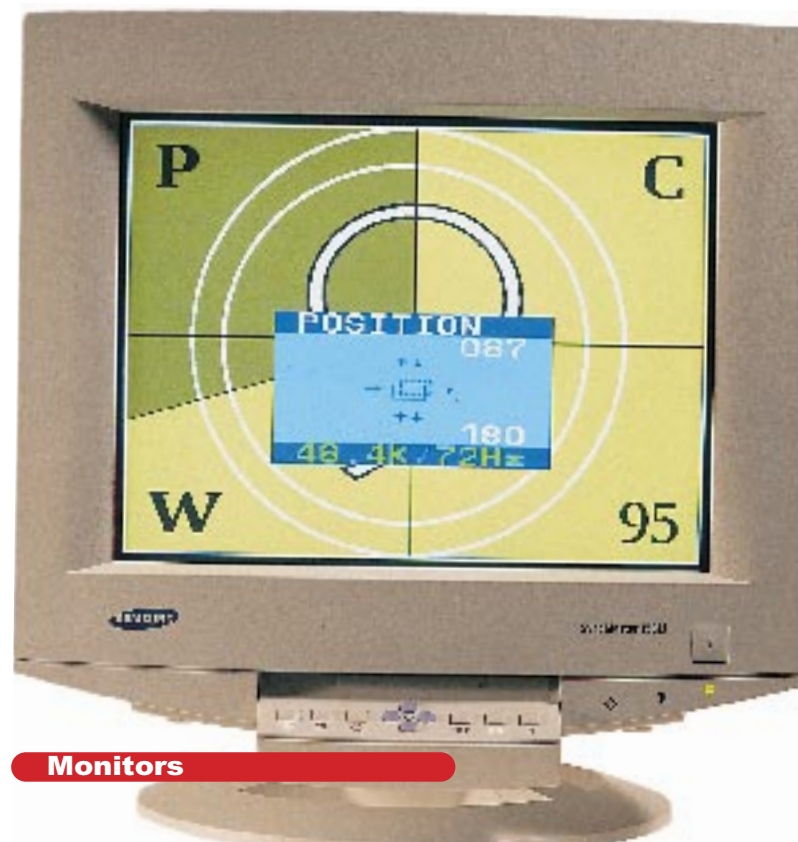
Finally, find out whether your video card is "local bus" or not. "Local bus" is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU which makes it a lot faster than the standard ISA (Industry Standard Architecture) interface.

Recommended Products: Graphics Cards

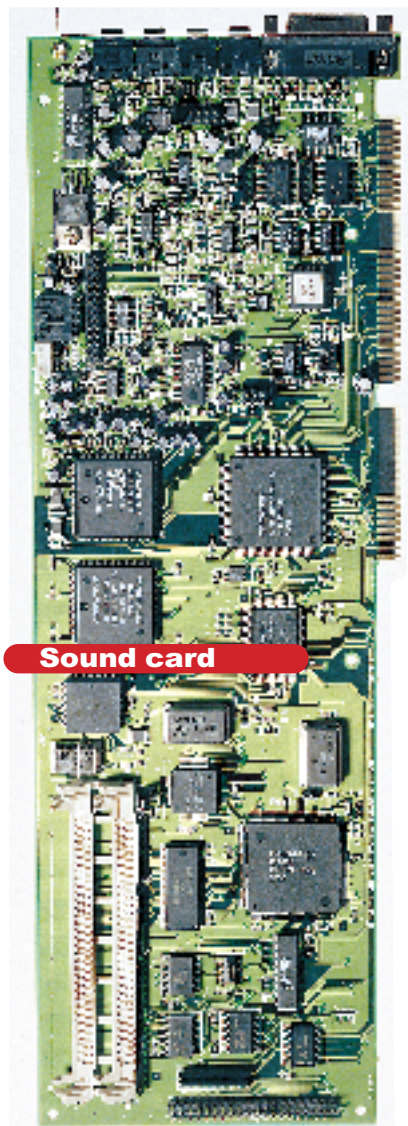
ATI Video Xpression: ATI Technologies 01235 833666; around £175 (see Graphics Card group test, PCW June '96)

Diamond Stealth 64 VRAM: Diamond 01753 501400; from around £190

VideoLogic GrafixStar 400: VideoLogic 01923 260511 from about £115



Monitors



Buying a SOUND CARD

As its name suggests, it adds sound capability to a PC. Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better sound cards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable. The newer cards are also plug'n'play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

Recommended Products: Sound Cards

Creative Labs AWE-32: 01245 265265; £199 (PCW, April '96).

Budget: Aztech SoundGalaxy Waverider Pro: Aztech 01734 814121; £79 (PCW, April '96).

● CONTACT MANAGERS (see PIMs)

D
● DATABASE At its simplest, an electronic card index. For just a few hundred names and addresses, an electronic filofax such as Lotus's Organizer may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most office environments you're more likely to use a database application that somebody else has written for you.

Recommended products: Lotus Approach, Microsoft Access

● DRAWING SOFTWARE Programs for drawing that work using vectors. This means each shape drawn is described using mathematical equations.

Recommended products: At the budget end, GSP Designworks 3 stands out. At the professional end of things it's FreeHand 5 which gets our plaudits.

I
● IMAGE EDITING SOFTWARE A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing.

Recommended product: For simple image editing the popular shareware program Paintshop Pro is fine. For professionals, Adobe's Photoshop is the industry standard.

● INTEGRATED PACKAGES Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications in the Suites.

Recommended product: Microsoft Works

● OCR SOFTWARE Optical Character Recognition software converts printed text into computer text you can edit. You will also need a scanner or fax card to get the printed text on to your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.

Recommended products: Omnipage is the best product we've found, but TextBridge offers most of the same capabilities for less cash.

● PERSONAL FINANCE These help you manage home finances. They're also well suited to some small businesses and tend

to be easier to use than full-blown accounts packages.

Recommended products: Quicken is the outstanding product in this category and has no serious rivals.

● REMOTE CONTROL SOFTWARE Software which lets you access and control a PC remotely usually using a modem.

Recommended products: Reachout, for its simple interface and support for different networks, particularly TCP/IP.

● SPREADSHEET An electronic version of an old-fashioned ledger. Ideally suited for balance sheets and sales figures. They now include excellent graphing and charting facilities.

Recommended products: Lotus 1-2-3, Microsoft Excel.

S
● SUITES These days, most general business software (word processors, spreadsheets, presentation graphics packages) is sold in suites. Two suites are widely available: Lotus SmartSuite and Microsoft Office. If you buy them bundled with a new PC, they can cost £100 or less. Bought separately, they cost between £200 and £300. Lotus SmartSuite also contains a

database. For Microsoft Office you pay extra for Office Professional which contains Microsoft's Access database. **Recommended products:** Microsoft Office is now close to the industry standard. Its high level of integration gives it the edge over the opposition.

P
● PERSONAL INFORMATION MANAGERS (PIMs) PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients. **Recommended products:** Sidekick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

● PRESENTATION GRAPHICS Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips. **Recommended products:** Powerpoint and FreeHand are both capable products that are sold with Microsoft Office and

SmartSuite respectively. **● PROGRAMMING TOOLS** Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which are much easier to use but generally sacrifice performance and flexibility in the process. **Recommended products:** Delphi 2.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Visual C++ is the pick of the high-end Windows development tools.

V
VISUAL PROGRAMMING (see Programming Tools).

W
WORD PROCESSOR An application in which you write letters and reports or even produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding up columns of figures. **Recommended products:** Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.



Buying SOFTWARE

Just a few years ago there were dozens of different software applications in each category. In the last two years or so, however, there's been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and aren't worth considering. We've distilled each category down to just one or two recommended products.

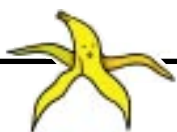
Software A-Z

A
● ACCOUNTS SOFTWARE One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS. **Recommended products:** Lakeview LMS and Exchequer from SBS Systems.

C
● CAD SOFTWARE Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings. **Recommended products:** AutoCAD, now at release 13, is still the industry standard. However, it's expensive and complex. For the casual user, Drafix QuickCAD is a cheap and accessible way to try your hand at it.

A-Z of Recommended Software Products

	Category	Product	Supplier	Contact	Price (Excl. VAT)	Date of PCW review
A	Accounts	Lakeview LM3	Lakeview Computers	0181 303 3329	£8,750	Jan-96
	Accounts	Exchequer	SBS Financial Systems	01202 298008	£5,980	Jan-96
C	CAD	AutoCad Release 13	Autodesk UK	01483 303 322	£3,150	Oct-95
	CAD	Drafix Quick CAD	Roderick Manhattan	0181 875 4400	£69	Oct-95
D	Database	Approach	Lotus	01784 455 445	£99	Nov-95
	Database	Access	Microsoft	01734 270 001	£220	Feb-96
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr-96
	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr-96
I	Image Editing	Photoshop	Adobe	0181 606 4000	£382	Apr-95
	Image Editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun-95
	Integrated Package	Works	Microsoft	01734 270 001	£79.99	Oct-95
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov-95
	OCR	Textbridge	Xerox Imaging Systems	01734 668 421	£349	Nov-95
P	Personal Finance	Quicken	Intuit	0800 585058	£39.95 (Incl. VAT)	May-96
	PIM/contact manager	Organizer 2.1	Lotus	01784 455 445	£99	Mar-96
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar-96
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar-96
	Presentation graphics	Freelance	Lotus	01784 455 445	£415	Sep-94
	Presentation graphics	Powerpoint	Microsoft	01734 270 001	£220	Sep-94
	Programming tools	Visual C++	Microsoft	01734 270 001	£379	Feb-96
R	Programming tools	Delphi 2.0	Borland	01734 320 022	249	Feb-96
	Remote Control	Reachout	Stac Electronics	01483 740 763	£110	Nov-95
S	Spreadsheet	Excel	Microsoft	01734 270 001	£220	May-95
	Spreadsheet	1-2-3	Lotus	01784 455 445	£365	May-95
	Suite	Office (Standard)	Microsoft	01734 270 001	£360	Mar-96
	Suite	Office (Professional)	Microsoft	01734 270 001	£460	Mar-96
W	Word Processing	Word	Microsoft	01734 270 001	£220.00	Feb-95
	Word Processing	WordPro (AmiPro)	Lotus	01784 455 445	£99.00	Jun-95



Oops!

- The closing date for our Live '96 competition on page 93 is not 29th September, as stated, but 29th October.
- Internet Explorer 3.0 was accidentally left off August's final production cover disc. It will be on the October CD.
- The correct phone number for Trimble in August's *Newsprint* is 01256 760150.
- A letter entitled "Negative response" on page 50 of our May issue was accidentally credited to reader Colin Barnes at 100273,504@compuserve.com. Sorry, Colin.
- The price quoted to PCW by Gateway 2000 for the Gateway PS133 in last month's P133 group test should have been £1,594, not £1,469 as published. Gateway apologises for any confusion caused.
- In our PC group test last month we stated that MJN had not fully installed Windows 95. This was not the case and PCW regrets any confusion caused.
- In August's *Leisure Lines* prize puzzle, this diagram appeared without the numbers, making the puzzle virtually useless. Here is the complete diagram. The closing date for this puzzle, should anyone still wish to tackle it, is 20th August 1996. Sorry for the error.

○	●	◆		
⚓	○	⊗	⊗	31
◆	⚓	⚓	⊗	37
	⚓	⊗	⊗	
	43	32		33

On the move

Changes are afoot at *Personal Computer World*. As you may have noticed from this month's cast list on page 10, Cutting Edge editor PJ Fisher has been promoted to the position of Managing Editor. Gordon Laing has also been promoted, to Features Editor, and after nine years at PCW, Chris Cain is off to help run our sister title *What PC?* Good luck in your new roles, chaps!

Mr Internet

According to a recent survey undertaken by London-based Consumer Surveys, today's typical net surfer is more likely to be a high-earning manager than the stereotypical long-haired dropout who lives on takeaway pizzas and cans of lager.

Meet our top internet correspondent, PJ Fisher



Dylan gets the Eye

There's only one other publication in which you can appear that's as prestigious as PCW and that's *Private Eye*. Our reviewer, Dylan Armbrust, was exposed in the *Eye's* *Street of Shame* column (issue no. 902) when eagle-eyed informants spotted him exercising his journalistic integrity when reviewing a certain PC in our August group test. "IBM's only chance is to give them away," he concluded. And, in fact, we were giving one away in that month's competition. This faux pas was entirely deliberate... allegedly!

True Tales of Technical Support

Caller: "Hello, is this Tech Support?"
 Tech Rep: "Yes, it is. How may I help you?"
 Caller: "The cup holder on my PC is broken and I am within my warranty period. How do I go about getting that fixed?"
 Tech Rep: "I'm sorry... did you say cup holder?"
 Caller: "Yes, it's attached to the front of

my computer."
 Tech Rep: "Please excuse me if I seem a bit stumped; it's because I am. Did you receive this as part of a promotion, at a trade show? How did you get this cup holder? Does it have any trademark on it?"
 Caller: "It came with my computer, I don't know anything about a promotion. It just has 4X on it."

Songs in the key of C

Fuelled by the success of their recent comeback hit, "Free as a bird", the remaining Beatles have allegedly revamped some of their old classics for the computer age. PCW got its hands on a rough draft of the new version of the classic "Let it be":	approaches	Debugging some assembly
When I find my code in tons of trouble	And bugs are all that I can see	Soon you will be glad to Write in C, Write in C
Friends and colleagues come to me	Somewhere, someone whispers:	Write in C, Write in C
Speaking words of wisdom:	Write in C, Write in C	Write in C, yeah, Write in C
Write in C, write in C	Write in C, Write in C	Only wimps use BASIC
As the deadline fast	LOGO's dead and buried	Write in C, Write in C
	Write in C, Write in C	Write in C, Write in C
	I used to write a lot of FORTRAN	Write in C, oh, Write in C
	For science it worked flawlessly	Pascal won't quite cut it
	Try using it for graphics	Write in C, Write in C
	Write in C, Write in C	Write in C, yeah, Write in C
	If you've spent nearly 30 hours	Don't even mention COBOL
		Write in C, Write in C